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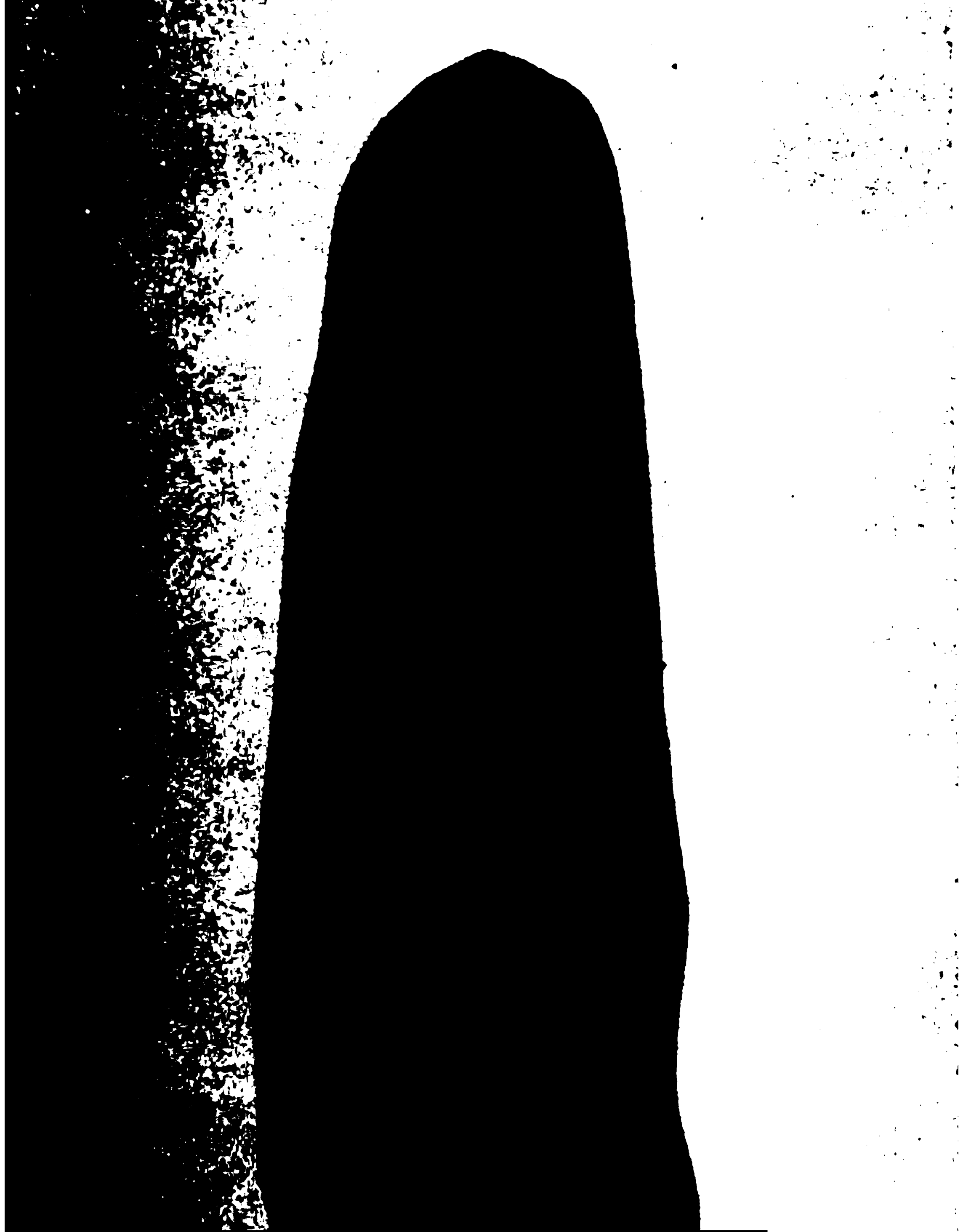

Agriculture of Pennsylvania

Pennsylvania. State Board of Agriculture, Pennsylvania. State Agricultural Society, Pennsylvania. State Dairymen's Assoc, Pennsylvania State College

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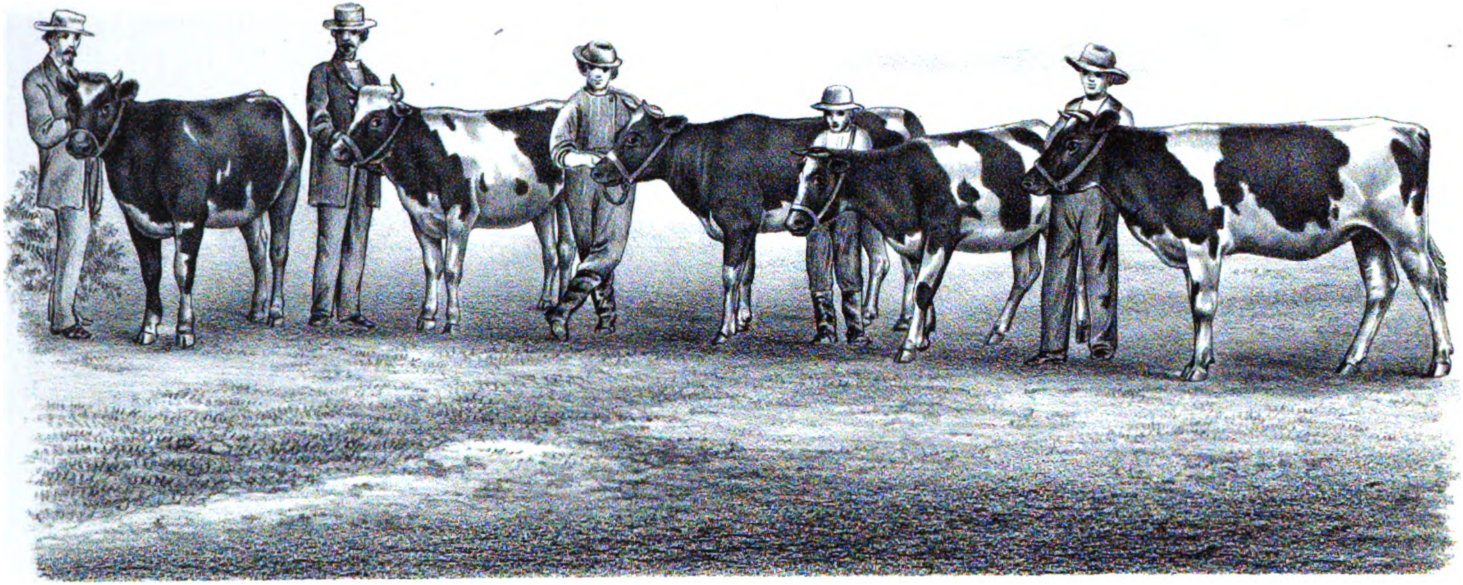

Imported Holstein Heifers

"GWYNEDD HERD"

Owned by Wm. M. Singerly, Gwynedd, Pa.

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[illegible] OF PENNSYLVANIA.

[illegible]

[illegible] BOARD OF [illegible]
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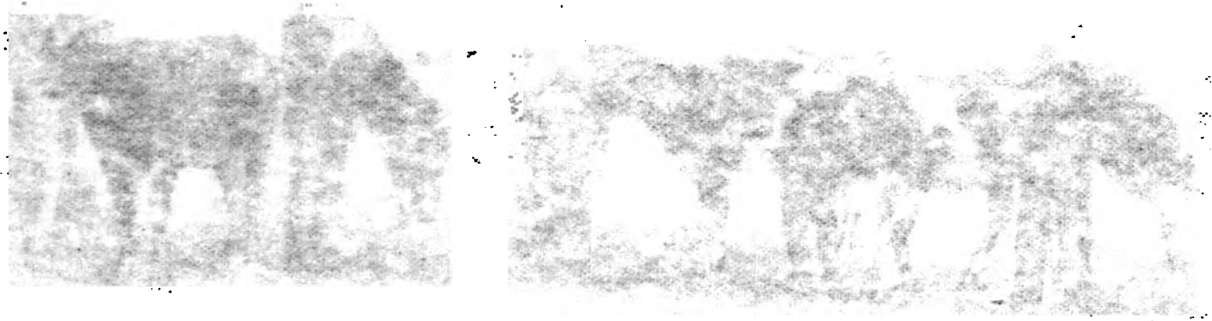

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Owned by Wm. M. Singerly, Gwynedd, Pa.

THE COMMONWEALTH OF PENNSYLVANIA.

Pennsylvania. Dept. of agriculture
Annual report.

AGRICULTURE OF PENNSYLVANIA,

CONTAINING

REPORTS OF THE STATE BOARD OF AGRICULTURE, THE STATE AGRICULTURAL SOCIETY, THE STATE DAIRYMEN'S ASSOCIATION, THE STATE FRUIT GROWERS' ASSOCIATION, AND THE STATE COLLEGE,

FOR 1879.

HARRISBURG:
LANE S. HART, STATE PRINTER.
1880.

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THIRD ANNUAL REPORT

OF THE

PENNSYLVANIA BOARD OF AGRICULTURE,

FOR THE YEAR 1879.

STATE BOARD OF AGRICULTURE, 1879.

Members Ex-Officio.

His Excellency Governor H. M. Hoyt.
Hon. A. K. Dunkle, *Secretary of Internal Affairs.*
Prof. J. P. Wickersham, *Superintendent Public Instruction.*
Hon. W. P. Schell, *Auditor General.*
Dr. James Calder, *President Pennsylvania State College.*

Appointed by the Governor.

		Term expires.
Dr. John P. Edge,	Downingtown,	1880
John L. George,	Monongahela City,	1881
Col. James Young,	Middletown,	1882

Elected by County Agricultural Societies.

Adams,	E. G. Fahnestock,	Gettysburg,	1882
Beaver,	R. S. Sterling,	Seventy-Six,	1881
Berks,	W. G. Moore,	Womelsdorf,	1880
Blair,	T. Banks,	Hollidaysburg,	1882
Bradford,	L. J. Culver,	Towanda,	1880
Bucks,	E. Reeder,	New Hope,	1881
Butler,	S. M. Weihl,	Harmony,	1882
Centre,	Prof. J. Hamilton,	State College,	1882
Chester,	Thos. J. Edge,	Londongrove,	1881
Clinton,	Joel J. Herr,	Cedar Springs,	1881
Columbia,	Chandlee Eves,	Millville,	1882
Crawford,	M. C. Beebe,	Pleasantville,	1880
Cumberland,	C. H. Mullin,	Mt. Holly Springs,	1882
Erie,	J. Miles,	Milesgrove,	1880
Franklin,	C. Gilbert,	Chambersburg,	1880
Indiana,	G. W. Hood,	Indiana,	1880
Juniata,	Prof. D. Wilson,	Port Royal,	1882
Lancaster,	H. M. Engle,	Marietta,	1880
Lawrence,	D. H. Wallace,	New Castle,	1882
Lehigh,	J. P. Barnes,	Allentown,	1881
Luzerne,	John B. Smith,	Kingston,	1882
Lycoming,	D. H. Foresman,	Williamsport,	1882
Mercer,	A. Robinson,	Mercer,	1881
Montgomery,	W. A. Yeakle,	Flourtown,	1881
Northampton,	Asher D. Shimer,	Bethlehem,	1882
Northumberland,	J. McFarland,	Watsontown,	1882

			Term expires.
Somerset,	C. C. Musselman,	Somerset,	1880
Schuylkill,	J. S. Keller,	Orwigsburg,	1881
Susquehanna,	J. C. Morris,	Friendsville,	1880
Tioga,	F. A. Allen,	Mansfield,	1882
Union,	J. W. Shriner,	Lewisburg,	1881
Wayne,	N. F. Underwood,	Lake Como,	1882
York,	W. S. Roland,	York,	1880

OFFICIAL LIST.

President.

His Excellency Governor H. M. Hoyt.

Vice Presidents.

Prof. J. P. Wickersham,
John L. George,
John C. Morris.

Executive Committee.

His Excellency Gov. H. M. Hoyt,
John P. Edge, Chester,
Col. James Young, Dauphin,
W. S. Roland, York,
D. H. Foresman, Lycoming,
H. M. Engle, Lancaster,
W. G. Moore Berks,
M. C. Beebe, Crawford,
D. Wilson, Juniata,
J. P. Barnes, Lehigh,
T. J. Edge, Chester.

Advisory Committee.

Col. James Young,
W. S. Roland,
H. M. Engle.

Secretary.

Thomas J. Edge.

Botonist.

Thomas Mehan, Germantown.

Pomologist.

Josiah Hoopes, West Chester.

Chemist.

Prof. F. A. Genth, University of Pennsylvania.

Entomologist.

Prof. W. A. Buckhout, State College.

Veterinary Surgeon.

Dr. C. B. Michener, Carversville.

Microscopist.

Dr. H. Leffmann, Philadelphia.

Mineralogist.

Dr. F. A. Genth, University of Pennsylvania.

Geologist.

Prof. J. P. Lesley, State Geologist.

Stenographer.

Col. H. C. Demming.

REPORT.

OFFICE OF THE PENNSYLVANIA BOARD OF AGRICULTURE,
HARRISBURG, PA., *January 1, 1880.*

To the Honorable Senate and House of Representatives of the General Assembly of Pennsylvania:

GENTLEMEN: In accordance with the requirements of the act of May 8, 1876, and by direction of the Board, I have the honor to herewith submit the third annual report of the Pennsylvania Board of Agriculture.

In compliance with the provisions of the third section of the act establishing the Board, its annual meeting was held at its office in the State capitol, and was well attended by members and others interested in the discussions. In addition to the annual meeting, two local or district meetings have been held, one at Philadelphia, in June, and the other at Mercer, in October. The attendance at these meetings, and the interest manifested by those present from the locality in which the meeting was held, may safely be taken as indications of the wisdom of this plan of holding the meetings, and when the attendance and manifested interest is compared with that of the annual meeting, the benefit and value of the local or district meetings becomes more apparent.

As will be noted in the detailed proceedings published elsewhere in this report, a large number of subjects of interest to our farmers, dairymen, and stock breeders have been discussed, not only by the members of the Board, but also by others in attendance, and it is to be regretted that the limited space assigned for our report will not permit the publication of these discussions in full, containing, as they do, the practical experience of men who are intimate with the calling which our Board represents, their deductions and results would be of great value to others.

In all cases it has been the desire and intent of the committee having the matter in charge, to prepare a list of such subjects as would prove most interesting and instructive to the district in which the meetings were held, and to invite the presence of persons who are noted for their familiarity and experience in the special branches selected for discussion, and it is to this care that much of the increased interest is due. It would be comparatively a waste of time to discuss questions relating to stock breeding at a meeting held in a district where the increased value of the land prevents the profitable pursuit of this branch, but where the same cause assisted by a saving in freight, fosters the interest of the dairy and vegetable garden. It would be, to the same extent, useless to discuss dairy topics in districts so remote from a market, as to prevent the economic production.

After a careful review of the subject in all of its bearings, the Board are even more sanguine as to the benefits of this plan than was exhibited in our report of last year, and when but a very short trial had demonstrated its good effects. The only valid objection thus far urged against this plan, is the increased expense of holding the meetings, and the consequent decrease in the number held during the year; but inasmuch as the object of the Board has been to accomplish the greatest possible benefit with the funds intrusted to it, we are of the opinion that this decrease in number is more than compensated by the increased interest manifested and the enlarged benefits conferred.

The provisions of section first of the act of May 8, 1876, are such that any county agricultural society which receives an annual bounty from the treasury of the county, may elect a member to represent them in the Board. The gradual increase in the number of this class of members from twelve, in 1876, (when the Board was established and organized,) to thirty-four, as at present, while it is another indication of increased interest, also involves an increase in the sum total of the necessary traveling expenses of the members, and has also its effect in decreasing the number of the meetings; but as has been urged in the preceding paragraph, we think the increase in numbers will lead to increased benefits in a still greater ratio.

The Introduction of New Sources of Profit.

The fact that the Pennsylvania farmer cannot much longer hope to compete with the low-priced and fertile lands of the West in the production of cereals and live stock, which, assisted by low freights, can be set down in our markets at a cost below that of production here, is becoming every year more and more apparent; and it is but a natural result that our more progressive and thinking farmers should be anxiously looking for some substitute which will afford them more remunerative results. Near our large cities and good markets the more perishable products of the dairy have been able to hold their own against similar western products, and hence it is the farmers who are at a greater distance from market who are most in need of new and more profitable crops.

This Board has always recognized as one of its leading duties, that of carefully investigating and fostering new sources of agricultural wealth and prosperity, and, as will be noted by reference to our reports of 1877 and 1878, and to the papers and discussions given in that report, the question of the profitable cultivation of some of our native fiber plants has for more than two years claimed the attention of the Board. The result of investigations and experiments, recorded not only in this State but also in New York and New Jersey, seem to demonstrate that this industry, with proper management, may, in due time, be made to add very materially to the profits of the farm. The large number of samples of native grown fiber which have from time to time reached the office of the Board, and the practical results laid before our June meeting by Samuel C. Brown, of New Jersey, and as set forth in the report of Mr. Lefranc, show the possibilities in this direction, and as soon as the profit of such culture has been plainly brought before our farmers, we may hope for solid and beneficial results.

As distinct from, yet closely allied to, the question of the production of textile fibers, we would direct your attention to the production of silk, as demonstrated by Mr. Chamberlain in this report, and to the practical operations and results, as shown at the Permanent Exhibition, in Philadelphia. The objection that this industry has already had a trial in this State and has apparently failed, will lose its force when we remember that this apparent failure was not so much due to the legitimate production of silk as to wild and visionary speculations in cuttings and trees for the production of leaves on which to feed a prospective crop of worms. Recent experience has proven that the range of plants, shrubs, and trees capable of furnishing food for the worms is much more extended than was formerly supposed;

that a number of plants of native growth are readily available; and that, when properly conducted, the production of silk may yield a result which will give greater profits than other sources now open to our farmers.

In the former attempt to make this crop a profitable one in many cases, the first and primary cause of loss in very many, if not most cases, was to be found in the fact, that this industry was made a specialty to the entire exclusion of other legitimate products. While such a cause may not have been sufficient to produce the effect noted, yet it has been clearly proven that when connected with other and more common farm industries, it has very much swelled the sum total of the profits.

As occupying an important place in the list of new products adapted to the agriculture of the State, we would also direct your attention to the successful experiments of Mr. Stewart, of Westmoreland county, in the product of sugar from the stalks and immature ears of corn. As has already been stated with reference to silk production, it may be claimed that this industry has also had its trial and failure, and that corn sugar was unable to compete with the product of the corn. Against this it may be fairly claimed that the failure was not due to the absence of sugar in the juice of the corn, but more properly to be attributed to a failure to use the proper means for its granulation, separation, and preparation for market. Mr. Stewart proves that he is not only able to extract the sugar, but also that he is able to do so at a cost which will enable the product to compete with imported sugar. During the coming year, this industry will be more fully tested, and if the present and past results obtained by Mr. Stewart, are to be accepted as a true index of the final result, we may add a new source of profit to our agriculture.

Fence Laws.

In our report of last year, we directed your attention to the importance of some change in the fence laws of the Commonwealth. It would seem that our present laws relating to this important interest, date back to 1700 and 1784, and are not in accord with the progress and change of condition which has taken place in the agriculture of our State since that time. When even the most recent of these laws was enacted, much of the now thickly settled portions of our State furnished free pasture grounds for all who chose to occupy them; these lands are now inclosed, and the inducement to allow stock to run at large has, in great measure, been removed. In many cases, special laws prevent stock of any kind from running at large on the highways, and in other cases the increased cost of fencing, and the introduction of other crops and methods of tillage, have rendered fences needless to the farmer, except as a protection against stock not his own. Instead of as formerly erecting fences to protect his crops from the stock on the highway, our farmers now realizes that the true purpose of the fence is to restrain his own stock. This is a radical change, and in time will be made still more apparent by the introduction of the soiling system, which will do away with many fences now deemed indispensable. Reliable statistics prove that the fences of our State cost not less than $1,125 for each one hundred acres of farm land, or a total of not less than $180,000,000, the estimated *annual* cost of re-placing and keeping them in repair is very nearly $10,000,000, and from our national reports, it would seem that the value of the live stock, and the cost of fencing are very nearly the same.

The increased cost of fencing in the thinly wooded and thickly settled districts, and the gradual but steady change in our mode of fencing would seem to render some change in those laws necessary. The subject has been considered, by the Board, to be of sufficient interest to warrant the appointment of a special committee, whose report will, no doubt, indicate a plan by which the problem may be solved, and a change suggested which, while it may be effective, will, at the same time, satisfy the demands of all sections of the State and all interests involved.

Diseases among Live Stock.

The official reporters of the Board, appointed by your members, have kept the Secretary of the Board constantly informed in relation to the live stock of their respective districts, and have promptly reported all cases of disease of a suspicious nature. When such reports have been received at the office of the Board, every case has been carefully investigated; and when occasion warranted it, the veterinary surgeon of the Board has at once been sent to the locality from which the report eminated.

Owing to the prompt passage of the act of May 1, 1879, and the prompt action of the Governor, in enforcing it, in conjunction with the act of 1866, pleuro-pneumonia has been held in check, and the loss very much diminished. Heretofore, one great cause of the spread of this disease was the action of the owner in keeping the animal alive, at the risk of infecting healthy stock, under the hope that it would either partially or entirely recover. By the action of the State authorities, under the act of 1869, supplemented by that of 1866, the infected animals are promptly killed, and the whole herd promptly placed under quarantine, so as to prevent the further spread of the disease. Previous to the passage of this act, it had been too often the custom to sell the herd (at some distant market) as soon as the infection was discovered, and thus spread the disease still further from its original center. The actual loss from this disease, since it first effected a lodgement in the State, has not been less than half a million of dollars, and it is to be hoped that the present combined efforts of New York, New Jersey, Massachusetts, Connecticut, in coöperation with the officers of our own State, may enable us to soon report the eradication of this disease. In any event, the present action of the Governor has prevented much loss, which would otherwise have fallen heavily upon the stock and dairy interests of the State.

The expense of eradicating this disease from the herds of Massachusetts has been $67,500, and the result has warranted the most sanguine expectations of the State officials. From the fact that the attempt was not made until the disease had obtained a strong foothold, very much increased the expense of eradication, and the loss to Massachusetts agriculture has been estimated by good authority at $1,750,000.

A full report of the work of this State, in an attempted removal of this disease, will be found elsewhere in this report, and we would respectfully direct your attention to it, as furnishing more definite information.

During the early part of September, the Secretary of the Board was officially notified of an outbreak of Texan or splenic fever among the horned stock of Westmoreland county. The Veterinary Surgeon of the Board was at once sent to the locality in which the disease prevailed, and rendered efficient service in preventing the further spread of the contagion. The result of his work is shown by his official report, in another portion of this volume. The increasing annual loss to the stock owners of the State, from Texan or splenic fever, will fully warrant the adoption of some kind of protective legislation. The infection is brought by southern or Texan cattle from districts bordering on the Gulf States, and while the disease does not seem to seriously affect the animals which convey it, yet as soon as they come in contact with our native or western stock, the mischief is accomplished beyond repair. Were it not for the fact that our diseased native and western stock cannot transmit the disease to other stock, it would decimate our herds annually, and prove quite as destructive as pleuro-pneumonia when unchecked. This disease is of such a contagious nature, that cattle are infected by passing over the same pasture or highway along which the Texan cattle has pastured or traveled; but unlike the virus of pleuro-pneumonia, its contagious character is neutralized or destroyed by the first heavy frost. If, by legislative enactment, properly enforced, this class of cattle could be prevented from entering the State, except at such time as would insure a few heavy frosts *before* their arrival in the fall, or *after* their arrival in the spring, the danger would be removed, and much loss avoided. Until either by national or State enactment this is done, our annual loss will continue, and will probably be increased by any increase in the number of this class of cattle brought into the State. While national legislation would, by its universal action, prove most effectual, yet by the combined action of several States, the evil could be avoided. During the coming year, this disease will receive a more thorough investigation at the hands of our Veterinary Surgeon and a special committee of the Board, and an act will be drafted and presented for action at your next meeting.

The increase in the number of contagious and endemic diseases to which our live stock are now liable, and the danger of the introduction of others even more fatal, makes the supervision of the health of farm animals a very important duty, and we are of the opinion that the action of the Secretary and Veterniary Surgeon of the Board, with regard to cases of hog cholera in Bedford county, pleuro-pneumonia in Delaware, Chester, Montgomery, and Lancaster, and Texan or splenic fever in Westmoreland, have saved the farmers of these districts thousands of dollars worth of live stock, at a total cost of last year's appropriation of two hundred dollars. In their action with regard to pleuro-pneumonia, the State officials have not been confined to this limited appropriation, but all the work accomplished by the Board has been within the limits of the sum named. Several of the eastern States, in view of the frequent outbreak of epidemic or endemic diseases, have created special commissions to take charge of such cases; but for all ordinary cases we would suggest a slight increase in this appropriation as an efficient substitute for the more cumbersome and more expensive commission.

In compliance with the request and suggestion of this Board, a commission has been named to investigate into and report on the causes of abortion among dairy stock, and if possible suggest remedies; five practical men were named to coöperate with the Veterniary Surgeon of the Board, and the result of their labor is given elsewhere in this report. At the special request of a number of practical dairymen and farmers the attention of our Microscopist has been directed to the probable cause of "ropy" or viscid milk, which has been a prominent cause of loss to the dairymen in the eastern section of the State. In these and other similar investigations undertaken by the Board, all expenses have been paid from the fund before alluded to, and in each case the result accomplished has repaid the outlay many times. In no case has any one engaged received any remuneration, except for actual and necessary expenses.

The Forests and Timber Lands of the State.

Ever since its inauguration (see reports of 1877 and 1878,) our Board has devoted considerable attention to the important and hitherto neglected interests of forestry, and the preservation and increase of the timber lands of the State. In our report of 1877, the subject was discussed by the

Secretary in all of its bearings. The area of forest land in each county of the State was given, and several plans for the preservation of the forests (some of which were adopted by the Legislature of 1879) were proposed and discussed. We would again call your attention to the rapid diminution of our supply of available timber, and to the importance of adopting some plan, either for preventing unnecessary waste, or for replacing the annual draft made upon this important product and source of State wealth. Aside from the climatic and physical effects of the removal of the timber, the problem has an important bearing upon other interests of the State. With our present annual consumption, it is not difficult to foresee the time when the failure in the supply will slowly but surely transfer the industries which depend upon this product to pursuits more accessible to the needed product. Of all of the many sources of wealth, timber and its resulting products will least bear high tariff of freight, and if, as has already been asserted in our former report, this industry gives employment to nineteen thousand two hundred and eighty-six of our citizens, employing a capital of $27,802,710, paying wages amounting to $6,220,393 annually, working up raw material worth $19,022,221 into commodities worth $35,262,590, its preservation is certainly worthy of your serious and careful attention. When to this we add the well known and generally admitted climatic changes which follow the removal of large areas of forests, we think the grave importance of the subject will fully warrant the adoption of precautionary and preventive measures.

The acts of May 2, 1879, (P. L., p. 47,) "To encourage the planting of trees along the roadsides in the Commonwealth," and of June 11, 1879, (P. L., p. 162,) "To prevent the burning of woods in any counties of the Commonwealth," will have an effect to increase the supply of timber, and to prevent its destruction. In addition to these, we would advise the passage of an act which should exempt lands *planted* with certain kinds of forest trees from taxation for a certain period after planting, and that, at the expiration of this time, the valuation of these lands for taxable purposes should not be increased by reason of trees thus planted. (See annual report of Board of Agriculture, 1877, page 58.)

There can be but little doubt that when assisted by the gradual substitution of iron for building, fencing, and railroad purposes, and by the more rigid economy in fencing which will be brought about by improved systems of farming, the protection from loss by fires, and by legislative encouragement of re-planting, this important industry of the State may be preserved intact for many years to come. Without this protection and assistance, its days are numbered, and its loss, not only as a productive industry, but also as a source of taxable wealth, will be severely felt.

In order that the whole matter of supply and reproduction may be brought forcibly before the people of the State, its plain importance properly understood, and the proper legislation suggested, we would recommend the appointment of a commission to consider the matter in all its bearings, and report such legislation as shall seem most likely to accomplish the desired ends. There are numbers of public-spirited citizens who are capable of dealing with the problem, and the actual expense would be very slight when compared with the results which would be attained by careful and systematic legislation.

In this connection, we would call your attention to the large areas of the cleared pine lands of the State, which in many cases only need cultivation to put them in the production of profitable crops. When the low price of these lands, and the near market afforded for their product, are taken into consideration, we think it will be found that they offer to the settler quite as flattering opportunities as the much lauded and more fertile lands of the West. On the latter, a large crop is often more than counterbalanced by low prices. In favor of settlement in our western States, it is claimed that the gradual increase in the value of the land will return a large interest upon the investment, but if you will refer to the past fifteen or twenty years in the history of Bradford, Tioga, Crawford, and kindred counties, we think you will find that even in Pennsylvania there are opportunities for profitable investment in her uncultivated lands, and that nearness to market will fully equal in advantages other apparently more favored localities. In our report of 1878, (page 6,) we referred to this important interest of the Commonwealth, and from it we would quote as follows: "It has been claimed that one of the leading drawbacks to the improvement and settlement of this class of lands is to be found in the fact that, if improved, even to but a limited extent, their value for taxable purposes is very much increased. The State and counties in which these lands are situated could very well afford to delay this increase in taxable value until the occupant has had time to become fairly established. It is to the interest of both the State and the land owner that these lands should be improved, for such improvement will, sooner or later, increase the revenues of both."

If when assisted by proper legislation a portion of these lands can be profitable replanted, and the remainder brought under cultivation, it will furnish a source of revenue which must make itself felt in our financial centers, and increase the revenue of the counties in which the lands are situated.

Progress.

In concluding this report we make use of the opportunity to call your attention to a few of the proofs of the increased value of our work as shown by changes since our first meeting, held February 1, 1877.

Then but fourteen county societies were represented in our Board; now thirty-two are represented by members who have at heart the interest which they represent. Then a programme for future action was prepared, but much was left for the development of the future. Now we have its development, and a vista of new work opened which seems limitless. Then none were present but members elect; now our local and district meetings are attended by hundreds. Then there was no central office to which our farmers could address letters of inquiry; now these letters come from every county in the Commonwealth, numbering hundreds monthly, and occupy no small part of the time of the Secretary in their answer; and though seemingly insignificant when considered as integers, yet when taken as a whole form a very important part of the work of the Board. Then the live stock of the State was at the mercy of any epidemic or endemic disease which might break out among them; now any such outbreak is at once reported by some of the three hundred and fifty official reporters named by your members, and a competent veterinary surgeon is at once sent to the locality, and by this action alone thousands of dollars' worth of live stock have been saved. Then no systematic means was afforded for the analysis of the fertilizers in use among our farmers; now without any expense to the State a legal enactment makes a regular series of analysis possible and efficient; and by raising the average standard of this class of goods, and keeping fraudulent hands out of the market, will save to our farmers many times the cost of the Board each year.

By order of the Board.

THOS. J. EDGE,
Secretary.

PROCEEDINGS

OF THE

PENNSYLVANIA BOARD OF AGRICULTURE.

CONDENSED FROM THE MINUTES.

ANNUAL MEETING.

At the annual meeting of the Pennsylvania Board of Agriculture, held in the office of the Board, January 22, 1879.

Board called to order at two o'clock, P. M., by J. P. WICKERSHAM, Vice President, in the chair.

Present—Messrs. Wickersham, Dr. Edge, Young, George, Sterling, Calder, Moore, Culver, Reeder, Beebe, Hood, Engle, Morris, Barnes, Yeakle, Musselman, Keller, Shriner, Mullin, Roland, Fahnestock, Wilson, Smith, Foresman, McFarland, and the Secretary.

Minutes of previous meeting read, and approved.

On motion of Mr. KELLER, the chair appointed a committee, consisting of Messrs. Keller, Beebe, and Roland, to receive and report upon the credentials of newly elected members.

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The SECRETARY offered the following resolution; which was unanimously adopted:

" WHEREAS, The annual loss from abortion among the dairy stock of the State is rapidly increasing;

AND WHEREAS, This Board has been requested, by its official reporters and others, to assist in procuring relief; therefore,

Resolved, That the President of the Board is hereby requested to appoint a committee of three, to act in coöperation with the Veterinary Surgeon of the Board, who shall investigate into the cause of this disease, if possible, suggest remedies, and report to the Secretary of the Board on or before the 1st day of November next."

The report of committee to act on the credentials of new members was read as follows:

" Your committee on credentials of members report that they have examined the same, and report the following persons as entitled to membership: D. H. Foresman, E. G. Fahnestock, F. A. Allen, David Wilson, John B. Smith, and John McFarland. Chandlee Eves presented a correct certificate of election, but none of bounty paid since 1863. We leave his case to the Board to decide whether he is lawfully entitled to seat."

(Signed) J. S. KELLER,
M. C. BEEBE,
W. S. ROLAND,
Committee.

After discussion, and on motion of Mr. **STERLING**, Mr. Eves, of Columbia, was declared duly elected as a member of the Board.

On motion of D. H. **FORESMAN**, the certificates of James Miles, of Erie, and N. F. Underwood, of Wayne, were referred to the committee on credentials, with directions to report as soon as convenient.

The act relating to increased bounties to county agricultural societies, as left over from previous meeting, was discussed, and, on motion, referred back to the committee.

The committee to prepare an act repealing the fence laws of 1700 and 1784, reported progress, and asked to be continued for further action.

On motion, it was resolved that the Secretary is requested to assign questions to members of the Board, or others who may be qualified to investigate them, to report thereon in writing to the Secretary, on or before the 1st of September: *Provided*, That said assignment shall be independent of and in addition to any questions which may be assigned for consideration at any meeting of the Board, and that a report may be made at any time.

On motion of Mr. **KELLER**, the chair named Messrs. Roland, Dr. Edge, Hood, Foresman, and Moore as a committee to nominate the officers for the ensuing year.

On motion of Mr. **FORESMAN**, the credentials of Prof. John Hamilton were accepted, without the usual reference to a committee.

A communication from Dr. A. L. Kennedy, president of the Polytechnic College, was read, and, on motion, referred to the advisory committee.

A supplemental report was read from the committee on credentials, relative to the rights of Messrs. Miles and Underwood to seats in the Board; and, on motion, they were admitted, on condition that previous to next meeting they furnish the Secretary with proof of the right of their respective societies to an annual bounty from the county.

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The committee appointed to audit the accounts of the Secretary, reported them correct, and their report was adopted.

The committee to nominate officers reported, as follows:

President—His Excellency H. M. Hoyt.

Vice Presidents—J. P. Wickersham, John L. George, and John C. Morris.

Executive Committee—His Excellency H. M. Hoyt, John P. Edge, James Young, W. S. Roland, D. H. Foresman, H. M. Engle, W. G. Moore, M. C. Beebe, D. Wilson, J. P. Barnes, and the Secretary.

Secretary—Thomas J. Edge.

On motion, the election of these officers was confirmed by ballot.

On motion of Mr. **BEEBE**, it was

Resolved, That it be the duty of each member of the Board to report to the Secretary on the fair of his own county, and as many more as may be practicable. The same to be done without compensation, and furnished to the Secretary not later than October 15.

A communication from the president of the Permanent Exhibition Company, of Philadelphia, was read; and, on motion, was referred to a committee to be appointed by the chair.

The chair named as said committee, Messrs. Roland, Dr. Edge, Morris, Moore, and the Secretary. (By a subsequent resolution, J. P. Wickersham was added to the committee.)

Adjourned, to meet at seven o'clock, P. M.

At an adjourned meeting of the Board, held Wednesday evening, January 22, 1879.

Board called to order at half past seven, P. M., by Vice President Wickersham in the chair.

On motion of Mr. GEORGE, it was resolved that the three Vice Presidents be a committee to inform His Excellency Governor Hoyt of the meeting of the Board, and invite him to be present at our sessions.

On motion, Dr. H. LEFFMANN, the Miscroscopist of the Board, was invited to deliver a lecture on Fungi—large and small, and their relation to agriculture. (In his lecture, Doctor Leffmann referred to the fungoid growth, which is the cause of "rot" in potatoes, and also the species causing the souring of milk. The former was fully illustrated by large drawings.

An essay on "The Sunny and Shady Sides of Farm Life" was read by GEORGE W. HOOD, of Indiana, and discussed by Messrs. Wilson, Roland, Hazard, Calder, and Foresman.

On motion, Dr. CALDER, President of the State College, was invited to deliver an address on Grape Growing in Pennsylvania—Varieties and Treatment.

After a full discussion of the essays and address, adjourned to meet at fifteen minutes past nine, A. M.

At an adjourned meeting of the Board, held January 23, 1879.

Board called to order at fifteen minutes past nine, A. M., by J. P. Wickersham in the chair.

On motion, Mr. C. C. MUSSELMAN read an essay on the Elevation of the Standard of Agriculture, the subject matter of which was fully discussed by Messrs. Wickersham, Engle, Foresman, and Wilson.

Essay on the "Negative Side of the Guenon System," read by Mr. REEDER, of Bucks, and discussed by Messrs. Smith, Barnes, Hazard, Wilson, and Reeder.

On motion, Messrs. ALLEN, YOUNG, and the SECRETARY read essays upon various branches of farm drainage, including draining with stone and tile. The matter of the essays was fully discussed by Hazard, Young, Wilson, Keller, Musselman, Allen, Eves, and the Secretary.

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The committee on fence laws reported a bill repealing the laws of 1700 and 1784, and, on motion of Mr. Foresman, the committee was instructed to present the bill to the Legislature.

The committee on the subject of bounty to county agricultural societies reported a draft of a bill, which, after full discussion by Messrs. Keller, Foresman, Beebe, Dr. Edge, Moore, Roland, Barnes, Morris, and Wilson, was laid on the table.

His Excellency Governor Hoyt was (during a recess taken for that purpose) introduced to the members of the Board, and, after promising the Board his hearty support, withdrew.

On motion, it was resolved that the Board adjourn finally at the end of the evening session.

On motion, adjourned to meet at two, P. M.

At an adjourned session of the Board, held January 23, 1879.

Board called to order at two, P. M., by Vice President Wickersham in the chair.

After a full and free discussion, the communication of the president of the Permanent Exhibition Company, relative to an exhibit of the grain of the State, was referred to a committee consisting of Messrs. Roland, Dr. Edge, Morris, Moore, and the Secretary.

On motion, Vice President Wickersham was added to the committee.

On motion of Mr. **BEEBE**, Calvin Cooper, president of the Lancaster County Agricultural Society, was invited to read an essay upon the Care of Fruit Trees, and Mr. Barnes, of Lehigh, one on the Production of Milk, which were discussed, and, with essays previously read, ordered to be incorporated in the next annual report.

On motion of Mr. **MOORE**, of Berks, the subject for general discussion—"Tickets of Admission to County Fairs"—was postponed until the next meeting.

On motion of Mr. **BEEBE**, seconded by Mr. **MUSSELMAN**, the vote on the motion to adjourn finally at the end of the evening session, was reconsidered and amended, so as to provide for an adjournment at the close of the afternoon session, for which change Mr. Beebe assigned as a reason, the fact that another session would detain many of the members another day.

By special request, Prof. J. P. **WICKERSHAM**, Superintendent of Public Instruction, favored the Board with a short address on the subject of "Education in Europe, as it Affects Agriculture," but owing to the short time at his disposal, deferred the main part of his address until another meeting.

On motion of Mr. **BEEBE**, it was

Resolved, That the State Board of Agriculture endorse the views of Prof. J. P. Wickersham, in relation to the introduction of agriculture text-books into our common schools, and recommend the necessary legislation to accomplish the result proposed.

On motion, all unfinished business was referred to the Executive Committee.

Adjourned, to meet at the call of the Executive Committee.

SUMMER MEETING.

At a meeting of the State Board of Agriculture, held in the hall of the Permanent Exhibition Company in Philadelphia, commencing June 5, 1879.

Board called to order at half past ten, A. M., by Hon. M. C. Beebe, who nominated D. H. Foresman, of Lycoming, as President *pro tem.*

Minutes of previous meeting read by the Secretary, and approved.

The **SECRETARY** reported that, in obedience to the resolution authorizing an investigation into the cause of abortion among cows, the President had named Dr. Isaiah Michener, of Bucks, Dr. John P. Edge, of Chester, Samuel W. Comly, of Montgomery, and Watson P. Magill, of Bucks, to coöperate with C. B. Michener, Veterinary Surgeon of the Board, in the examination.

That in accordance with instructions, he had used all fair means to secure the passage of the fertilizer law prepared and presented by the committee of the Board, and that its passage was probable, if not too late in the session. (The law passed finally during the last day of the session, and has recived the signature of the Governor.)

That a draft of an act having for its object the repeal of the fence laws of 1700 and 1784, had been presented by Hon. C. H. Seymour, in the Senate, but was not acted on, on account of the large amount of other business claiming attention.

That Messrs. Miles, of Erie, and Underwood, of Wayne, had, in accordance with the resolution of the annual meeting, furnished him with proper proof that their respective county agricultural societies were justly entitled to an annual bounty from the county, and thus fully confirmed their right to a membership in the Board.

That the Northampton County Agricultural Society had officially informed of the election of Asher D. Shrimer, of Bethlehem, to represent them in the Board, and that, for a like purpose, the Clinton County Agricultural Society had elected Joel A. Herr.

That he had received official notice of the appointment of the following delegates from county societies and other agricultural organizations, viz:

Berks County Agricultural and Horticultural Society, Col. J. L. Stichter, Samuel B. Knabb, Hon. George D. Stitzel, and Jacob G. Zerr, president of the society; Oxford (Chester county) Agricultural Society, Thomas Wood; Bucks County Agricultural Society, Thomas C. Knowles and Robert C. Eastburn; Chester County Agricultural Society, William W. Parker; Eastern Pennsylvania Experimental Farm Club, Job H. Jackson and Samuel R. Downing; Buckingham Valley Grange, (No. 453, Bucks county,) Joseph Landis, S. Landis, and Horace Michener.

On motion of Dr. ROLAND, these delegates were invited to participate in the discussions of the Board; amended by Mr. Yeakle so as to include all present at the meeting, and adopted.

Mr. EVES informed the meeting that Samuel J. Levick, secretary of the Pennsylvania Society for the Prevention of Cruelty to Animals, wished to address the Board at some time during its sessions, on the subject of the improvement of the condition of veterinary science in the State.

On motion of Mr. EVES, it was agreed that twenty minutes of the afternoon session should be devoted to this purpose.

In accordance with the programme, Prof. WILLIAM BARBECK read an essay upon the "Microscopic Fungi in Cereals," the subject matter of which was fully discussed by Messrs. Meehan, Smith, Beebe, and others.

By request, SAMUEL CHAMBERLAIN, of Philadelphia, then read an essay upon "Silk Culture," and, at its close, stated that as a branch of the educational feature of the permanent exhibition, he had established in the building a school in which *practical* silk culture—from the hatching and feeding of the worms to the reeling of the silk—could be learned, and invited the members of the Board to inspect the industry in its various stages. President Paxson, of the Permanent Exhibition Company, invited the Board to inspect the exhibits in the main building at any time most convenient. The Secretary of the Board announced that a section of Cooley's creamery was in practical operation in the agricultural department of the exhibition.

On motion of Mr. BEEBE, the Board accepted the invitations of Messrs. Chamberlain and Paxson, and, on motion of Mr. EVES, it was agreed that the morning sessions should terminate at one o'clock, with a recess of one hour for dinner and inspection of building and exhibits.

On motion, adjourned to meet at two o'clock, P. M.

At an adjourned session of the Board held Thursday, March 5, 1879.

Board called to order at half past two o'clock, P. M., by President *pro tem.* Foresman in the chair.

On motion of Mr. **MOORE**, the certificates of Mr. Shimer, member elect from Northampton, and Mr. Herr, member elect from Clinton, were referred to a committee, as members of which the chair named Messrs. Moore, Young, and Beebe.

An essay on "Contagious Pleuro-pneumonia" was then read by C. B. Michener, Veterinary Surgeon of the Board.

The President *pro tem.* then read the report of the committee of the State Legislature appointed to investigate into the condition of the Pennsylvania State College, and its president, Dr. Calder, asked the Board to permit him to make a few remarks in defense of the institution, which was granted.

The committee having in charge the credentials of Messrs. Shimer and Herr, reported that both were entitled to membership in the Board. After discussion, on motion of Mr. Keller, seconded by Mr. Musselman, the report was accepted.

An essay by J. S. **KELLER**, of Schuylkill, on "Recklessness with Fertilizing Substances," was then read, in which he deplored the practice of allowing the products of the fowl-house and barn-yard to run to waste, and urged their being piled together, covered with light earth, and made into a compost. Vegetable matter, the paper stated, was also thrown away, often upon the high road, instead of being heaped up under coal ashes, or other material, and preserved to turn into mould and enrich the soil. The essay ended by commenting severely on the carelessness which allowed manure to lie upon the surface of the earth till it was dried into useless dust, instead of being plowed underground immediately. In conclusion Mr. Keller urged most earnestly the great value and importance of preserving all the home products that could be made to fertilize a farm.

THOMAS MEEHAN, Botanist of the Board, then addressed the meeting upon the subject of "The Sex of Plants," and was listened to with great attention, and brought forth considerable discussion.

On motion, adjourned to meet at half past ten, A. M.

At an adjourned session of the Board, held Friday, June 6, 1879..

Board called to order at half past ten, A. M., by Vice President John C. Morris, in the chair.

By request, **HORACE J. SMITH** read an essay, prepared by F. L. Stewart, of Westmoreland county, on the "Manufacture of Sugar from Corn."

At his own request, the reading of an essay of Mr. Reeder, on the "Agricultural History of Bucks County," was postponed until next meeting, and it was decided that the time allotted to it on the programme should be devoted to the discussion of the general subject—"Tickets of Admission to County Fairs."

L. S. **HARDIN**, of New York, then read an essay on "Pennsylvania Dairying, as Seen by an Outsider," which was fully discussed by Messrs. **KELLER**, **BEEBE**, **TAYLOR**, **WOOD**, **FORESMAN**, **PARKER**, and **LEVICK**.

HORACE J. SMITH, on behalf of Mr. Levick, presented the following:

WHEREAS, The board of trustees of the University of Pennsylvania have passed a resolution for the establishment of a veterinary department as soon as suitable endowment can be raised;

And whereas, The Pennsylvania Society for the Prevention of Cruelty to Animals (incorporated by this State) has been daily confronted with the need of more educated veterinary practitioners, and has, by its president, Coleman Sellers, Esq., issued a circular to the citizens of the State upon this subject, and has (with the approval of the trustees of the University) volunteered their services in obtaining from our citizens the collection of money endowing this department;

And whereas, The immense interest at stake in the health and life of our domestic animals, demands the thorough instruction in veterinary science of men having suitable preliminary education;

And whereas, The fact that the trustees of the University of Pennsylvania are willing to assume the care of such a trust, is a guarantee that it will be administered in the manner best calculated to attain the desired results, and secure the veterinary school against the possibility of degenerating into a second rate affair; therefore,

Resolved, That the State Board of Agriculture recommends to individuals and corporations owning or interested in horses, cattle, or other live stock, to subscribe liberally and immediately to "the board of trustees of the University of Pennsylvania for the endowment of a veterinary department," or through the medium of the Pennsylvania Society for the Prevention of Cruelty to Animals, through Cadwallader Biddle, Esq., No. 208 South Fourth street, Philadelphia.

After a full and free discussion, by Messrs. BEEBE, FORESMAN, HAZARD, MCCOART, KELLER, DR. EDGE, SHRINER, HERR, and CALDER, the resolution was, on motion of Mr. Beebe, referred to a committee, to be named by the Chair, with instructions to report at next meeting of the Board in October.

Amended by Mr. Smith, that the report be made at the afternoon session.

Mr. Smith's amendment lost, and the original resolution agreed to. The Chair announced Messrs. Musselman, McFarland, and Barnes as the committee to take charge of the resolution."

After the reading of an essay on "Agricultural Societies, Grounds, Buildings, and Fairs," by Dr. ROLAND, of York, the Board adjourned to meet at half past ten, P. M.

At an adjourned session, held Friday, June 6, 1879.

Board called to order at half past two, P. M., by Vice President Morris, in the chair.

On motion of the SECRETARY, Samuel C. Brown, Secretary of the Bureau of Statistics of Labor and Industry of New Jersey, read an essay upon the culture of the new fiber plant—"American Jute"—*Abutilon Avacenae*.

The general subject of tickets of admission to county fairs was then taken up, and further discussed by Messrs. Keller, Barnes, Herr, Holcombe, and Zerr.

On motion of Colonel YOUNG, Dr. Edge was invited to read an essay upon European and American agriculture.

Mr. REEDER, of Bucks, offered the following:

Resolved, That the Secretary is hereby instructed to assign to each member the duty of visiting and reporting upon the fair of at least one of the county societies now represented in this Board, and that in each case the system of issuing tickets shall form a leading item for examination and report. Adopted.

On motion of Mr. BEEBE, it was

Resolved, That the State Board of Agriculture urge upon Congress the necessity of maintaining existing legislation as a protection to this country against the importation of cattle affected by pleuro-pneumonia and other contageous diseases.

On motion of Mr. **KELLER**, the Board then proceeded to fix a place for the fall meeting.

Mr. **BARNES** named Allentown; Mr. **MOORE**, Reading; Mr. **FORESMAN**, Bellefonte; Mr. **ROBINSON**, Mercer; and Mr. **ROLAND**, York.

After discussion, and on motion of Mr. **ROBINSON**, seconded by Mr. **FORESMAN**, it was resolved that the next meeting be held at Mercer, commencing on the third Wednesday in October.

On motion of Mr. **BEEBE**, the Secretary was instructed to retain the subject assigned to Vice President Wickersham, "The Industrial Education of Europe as it Affects Agriculture," for a place in the programme of the October meeting.

Adjourned, to meet as above.

FALL MEETING.

At a meeting of the Pennsylvania Board of Agriculture, held at Mercer, Wednesday, October 15, 1879,

Board called to order at two, P. M., by Vice President Wickersham in in the chair.

Minutes of previous meeting read and approved.

Present—Messrs. Wickersham, Calder, Dr. Edge, Fahnestock, Sterling, Moore, Herr, Eves, Beebe, Hood, Engle, Smith, Robinson, Yeakle, Shimer, Musselman, Miles, Keller, Allen, Underwood, and Secretary.

On motion, the Chair named Messrs. Roland, Moore, and Beebe a committee to receive and report upon the credentials presented by newly elected members, and the Secretary announced that Col. D. H. Wallace, of Lawrence county, and S. M. Weihl, of Butler county, presented certificates of election as members of the Board by their respective county agricultural societies; which were referred to the above committee.

On motion of Dr. **CALDER**, the committee having charge of the resolution relative to the establishment of a chair of veterinary science in the University of Pennsylvania, were discharged from a further consideration of the question, and on motion of Prof. **ALLEN**, the whole subject was laid on the table.

During the absence of the committee on credentials, H. M. **ENGLE** read an essay upon "Diversified Agriculture," the subject matter of which was discussed by Messrs. Calder, Edge, Smith, and Allen.

The committee on credentials presented the following report:

The committee appointed to examine the credentials of members elected to the State Board of Agriculture, respectfully report:

That the credentials and certificate of S. M. Weihl, member elect from the Connoquenessing Valley Agricultural Society, of Butler county, are in due form; therefore,

Resolved, That S. M. Weihle be received as a member.

(Signed,)

W. S. **ROLAND**,
M. C. **BEEBE**,
W. G. **MOORE**.

With regard to the certificate of Col. D. H. Wallace, elected as a member to represent Lawrence County Agricultural and Horticultural Society, the society does not and is not entitled to receive bounty from the county; therefore,

Resolved, That the certificate is not complete.

(Signed,) W. S. ROLAND.

The undersigned, in the case of Col. D. H. Wallace, member elect from Lawrence county, report: that the society said Wallace represents having complied with all the conditions entitling them to a membership by the act, the said Wallace is entitled to a seat.

(Signed,) M. C. BEEBE,
W. G. MOORE.

On motion of Mr. FAHNESTOCK, the report of the committee, so far as it refers to S. M. Weihl, was adopted.

On motion of Mr. FAHNESTOCK, of Adams, the report of the majority of the committee in the case of Col. D. H. Wallace was accepted, and he declared entitled to a membership in the Board.

By request, Prof. J. P. Wickersham, Superintendent of Public Instruction, then addressed the Board upon the subject of "Industrial Education in Europe as it Affects Agriculture."

After discussion, Mr. ROLAND offered the following, which was adopted:

WHEREAS, Prof. J. P. Wickersham, in a very able and instructive address before the Board on "Industrial Education of Europe as it Affects Agriculture," has referred to the many advantages derived from industrial museums in Europe, and has so pointedly put the question, "why cannot the State Board of Agriculture be the means of organizing and establishing such an institution in this State;" therefore,

Resolved, That a committee be appointed, of which Prof. Wickersham shall be chairman, to prepare, and submit a plan at the annual meeting in January next, for the establishmrnt of a State industrial museum.

At an adjourned session of the Board held Wednesday evening, October 15, 1879.

Board called to order at seven, P. M., by Vice President J. P. Wickersham in the chair.

On behalf of the citizens of Mercer, S. F. Miller, Esq., cordially welcomed the members of the Board, and responses were made by the Vice President and Dr. Edge.

By request, Hon. X. A. WILLARD delivered a lecture upon "The Changes needed in Dairying to meet Low Prices," which was freely discussed by members of the Board and those present.

ASA BATTLES, of Erie county, gave the "Result of Fifteen Years Experience in Fruit Culture in Pennsylvania;" and answered various questions relating thereto.

On motion of Mr. BEEBE, and seconded by Mr. HERR, it was

Resolved, That Henry C. Demming be recognized as the official stenographer of this Board from its organization.

Adjourned.

At an adjourned session of the Board, held Thursday, October 16, 1879.

Board called to order at half past eight, A. M., by Vice President Wickersham, in the chair.

Minutes of previous meeting read and approved.

In accordance with a resolution of the previous session, the President announced that he named W. S. Roland and Dr. J. P. Edge as members of the committee to suggest a plan for starting an industrial museum.

Mr. ROLLAND offered the following, which, after discussion, was adopted:

That the State Board of Agriculture was instituted and organized for useful industrial purposes; that as the personal expenses of the members are paid by the State, it is a duty which they owe to themselves and the societies which they represent to give the meetings of the Board all of their time and attention; that the Board at its meetings shall finish up the business as the same has been arranged on the programme, and shall not finally adjourn until all of said order of business has been attended to, except for good and sufficient reasons; and that before the final adjournment of the Board, the roll of those who have been in attendance shall be called, and any members absent, without permission from the Board, shall be dealt with as the members present may determine.

Dr. J. P. EDGE offered the following, which was unanimously adopted:

Resolved, That the members of this Board have viewed with much satisfaction the recent successful exhibition of the Pennsylvania Agricultural Society in connection with the Permanent Exhibition at Philadelphia, and we hail the large increase in the premiums offered, and also the absence of horse racing, as a feature of the fair worthy of commendation.

An invitation was then received from George W. Wright, president of the Mercer Soldiers' Orphan School, inviting the members of the Board to visit that institution.

On motion of F. A. ALLEN, it was

Resolved, That we tender to the proprietors of the Soldiers' Orphan School of Mercer our thanks for the invitation to visit the school, and that as far as possible and practicable we will individually accept the invitation.

By request, Vice President Wickersham was excused from further attendance, and Dr. J. P. Edge, called to the chair.

Mr. HOOD then read an essay upon "The Laws of Trespass, as they relate to Agriculture," and gave rise to considerable discussion, which was participated in by Messrs. Allen, Hood, Moore, Beebe, Smith, and others.

Essays were then read by Dr. JAMES CALDER and Hon. N. F. UNERWOOD, and fully discussed by members and others present.

On motion of Mr. ALLEN, it was

Resoved, That for the purpose of introducing agricultural and industrial studies into our common schools, and for awakening an interest among the people touching this subject, we urge upon each member of this Board, and the friends of agriculture generally, the plan of offering premiums or prizes at county fairs, to schools for excellence in class exercise in agricultural studies, and for exhibits.

Adjourned.

At an adjourned session held Thursday, October 16, 1879,

Board called to order at half past three, P. M., by Dr. J. P. Edge in the chair.

On motion of Mr. KELLER, the Chair was requested to name a committee of five members, to propose a time and place for the spring meeting of the Board. The Chair named Messrs. Keller, Calder, Smith, Herr, and Allen, with instructions to report to the annual meeting, the names of all places proposed.

Essays were then read by Messrs. ROLAND, HERR, and ALLEN.

Adjourned to meet at Harrisburg, at the time provided for the annual meeting.

REPORT OF THE CHEMIST.

THE SOUTH CAROLINA PHOSPHATES.

By Prof. F. A. GENTH, *Chemist Pennsylvania Board of Agriculture.*

It is not over forty years ago, that the first attempts were made to introduce practically into the cultivation of the soil, the fruits of the laborious investigations of Theodore deSaussure, J. B. Boussingault, Justus von Liebig, and others, who showed, that in the growth of plants large quantities of the inorganic constituents of the soil were taken up, which, on incineration of the plants, could be found in the remaining ash. It was ascertained that great differences existed in the amounts of ash which the various plants yield; and when their composition was carefully studied, it showed great variations in the different species, while for each kind it was, within very narrow limits, essentially the same.

Most of the ash constituents of plants are found in great abundance in all soils; some, however, and just those which are of the utmost importance, are present in small quantities, only sufficiently, perhaps, to produce in an original or " virgin " soil one or several abundant or fair crops. But, as every crop removes very large quantities of those substances, which are absolutely necessary for a healthy and vigorous growth, it is evident, that without replacing anything, even the most fertile lands, in a short time, will become exhausted, and be left barren and incapable for a further production. In favorably situated localities, where the soil-producing rocks contain large quantities of phosphoric acid and potash, and where they are readily disintegarted by the action of the atmosphere, rest may restore such exhausted lands to a former fertility; but this process is, at best, a very slow one, and it is certainly not in the spirit of the present century to rest and wait. Even if this natural process of fertilization is assisted by a liberal supply of stable or barn-yard manure, and fair crops are thus produced, it is quite inadequate, and cannot keep pace with the constant drain upon the lands by heavy crops.

There is only one rational resort left, namely: the application of well adapted and well prepared artificial manures.

By numerous investigations it has been carefully ascertained what quantities of the different constituents of the soil are removed by every crop, and upon this knowledge is based one of the first principles of modern and rational agriculture. "*Return to the land in an easily assimilable form all such substances as have been taken from it, provided the soil does not contain them already in abundance.*"

The most important of all the constituents of the ash of plants is phosphoric acid, next in importance comes potash, the others, almost without exception, are in sufficient quantity in all soils, or can be obtained, like lime or plaster, abundantly and cheaply, so that they are never purposely added in the manufacture of artificial fertilizers.

Without a sufficient quantity of phosphoric acid in the soil, the production of cereals or bread is an imposibility. It is therefore a question of *general* interest, not only to the farmer, who desires to keep up his land in the most productive condition, but also to the consumer of his products? *Where can we obtain an abundant supply of cheap phosphoric acid?*

Available phosphoric acid, that is such, which is readily taken up by the plants or the so-called soluble and reverted (or precipitated) phosphoric acid should, under all circumstances, be the principle constituent of every artificial manure. Most of them, however, contain besides this more or less salts of potash, sometimes salts of magnesia, and nitrogenous, constituents either in the form of nitrate of soda, or as ammonical salts, but mostly in the shape of dried flesh, blood, or fishs, the nitrogen of which is readily assimilated by the plants.

In my report, published in the first annual report of the Pennsylvania Board of Agriculture, under the head of "Phosphatic Raw Materials," pages 79–84, I mention, as the nearest, and for us the most important source of phosphoric acid, the beds of phosphatic nodules in South Carolina; and, as this occurrence is not only of great general interest, but especially of much importance to our farmers, I will give in the following a brief outline of its history and development.*

Formerly, the Legislature of South Carolina was the foremost in the desire to improve the internal resources of the State, and not less than four times geological, mineralogical, and agricultural surveys have been established.

In 1826, Professor Lardner Vanuxem, of this city, well known from his connection with the geological surveys of New York and New Jersey, having been appointed, in 1824, geologist of South Carolina, made his report to the Legislature of that State on the geological and mineralogical survey of the State, in which he predicts the discovery of "same kind of marl which has so greatly contributed to enhance the value of the poor lands of New Jersey."

In 1842, Edmund Ruffin, of Virginia, appointed by the Governor of South Carolina to make an agricultural survey of the State, discovered the existence of calcareous marls, and introduced the "marling" of lands. He was succeeded in 1843 by Professor M. Tuomey, who made his final report in 1846, which was published in 1848. In Tuomey's report the position and extent of the calcareous beds and marls of South Carolina were carefully mapped out, and, from analyses of Doctor Smith and Professor Shepard, the presence of phosphoric acid in these marls was fully established, its quantity, however, was found to be very small, the whole amount of phosphate of lime, together with oxide of iron, in nine analyses, giving quantities varying between 2 and 9.2 per centum.

Among other investigators, Louis Agassiz, Sir Charles Lyell, and R. W. Gibbes, of Columbia, South Carolina, have examined and visited the localities around Charleston. In the magnificent works on the Fossils of South Carolina, by Professor M. Tuomey and F. S. Holmes, and the Post-Pleiocene Fossils of South Carolina, by the latter, their geological observations are published in full.

Professor Holmes describes, (in 1859,) the geological formations in the vicinity of Charleston as follows:

"The post-pleiocene is an extensive formation in the lower flat country of South Carolina, and is included in a belt extending from the sea-cost about ten miles inland, and occupies depressions in the great marl bed of the eocene period."

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*A great part of the following paper has been condensed from a little pamphlet by Doctor N. A. Pratt, Ashley River Phosphates, Philadelphia, 1868.

"Three distinct formations or beds are supposed to belong to this age."

"The first, the marine beds, composed of gray, sandy clay," &c., &c.

"The second is the blue clay or 'pluff mud' bed, composed of a stiff blue clay, containing *siliceous pebbles* and *masses of conglomerates*, water-worn and boulder-like, but not angular blocks, and includes remains of marine and terrestrial animals. These pebbles and rolled conglomerates contain casts of fossils, common to the marl below, of the eocene bed, upon which the blue mud rests. And it has been ascertained that the *siliceous conglomerates* are fragments of the marl broken off, we infer, by the action of the waves, and rolled upon the beach of a post-pleiocene sea. They afterwards were imbedded in the blue mud, *but lost all their lime or calcareous particles and became silicified.*"

"The third or upper bed includes the peaty deposits, yellow sands, and clays, &c., &c., which overlie the pluff mud.

"The fossil bones obtained from some of these strata are often in a fine state of preservation, especially those taken from the blue (clay) mud, which are generally *petrified*. Those from the sands are likewise well preserved."

Although these surveys have given a great deal of valuable information with regard to the position of the various strata found in South Carolina, they failed to recognize the presence of the almost inexhaustible beds of phosphatic nodules, which are now one of the great sources of wealth not only to the State of South Carolina, but to the world. This was owing to the want of chemical investigation, which made the Geologists, from the external appearance of the nodules, to mistake the valuable phosphate of lime for worthless petrified, or rather silicified, conglomerates. They might still be so considered, if, about the 1st of August, 1867, Dr. St. Julien Ravenel had not called Dr. N. A. Pratt's attention to the fact that a specimen of a rock from Goose creek, near Charlestown, he had found to contain from ten to fifteen per cent. of phosphate of lime, a larger quantity than was ever before observed in the South Carolina marls. Dr. Pratt obtained a piece of the same rock, and on analysis, found over thirty-four per cent. of phosphate of lime in it, and recalling to his mind the existence of the nodules and conglomerates in the so-called "Fish bed" on the Ashley river, he examined some specimens, in which he found 55.52 and 55.92 per cent. of phosphate of lime respectively. He at once conceived the great importance of this discovery, and calling upon Prof. Holmes, who was more familiar with the position and extent of the geological strata around Charlestown, both together secured the principal localities, and hoped that with such a good thing in hand, they would have no difficulty to induce southern capitalists to join them in the exploitation of these strata. After many unsuccessful efforts, they came to Philadelphia, and it is due to the energy of some of our best and most enterprising citizens that, toward the end of 1867, a company was started under the name of "Charleston (S. C.) Mining and Manufacturing Company," the great success of which induced many others to follow, and in this manner, a business was developed which, within these few years, has assumed enormous proportions, furnishing, it is believed, not less than three fourths of all the phosphoric acid which is sold in some form or other of phosphatic fertilizers.

The beds of phosphatic nodules lies upon the marl beds of the eocene formation in depressions of the same. Their out-crops can be found on the banks of the Ashley, Cooper, Stone, Edisto, Combahee, Bull, and Coosaw rivers. The area containing these phosphatic nodules of workable quality, is estimated by Dr. Pratt at not less than forty to fifty square miles; but indications have been found which make it probable that they exist, in greater or less quantity, over an area of several hundred miles.

The nodules are generally found in the tenaceous blue clay of Holmes' post-pleiocene formation. The deposits are usually from two to eighteen inches thick, sometimes increasing to two or three feet, and the quantity of the nodules is often so large that, in some localities, the yield per acre is from five hundred to one thousand tons and more.

They do not form a regular stratum, but are detached deposits at irregular intervals along the river banks, which frequently thin out, and are rarely found in any abundance or available quantity beyond four hundred or five hundred yards from the water-courses. They are also found in large quantities in the beds of creeks or rivers.

The deposits in which they occur are composed of pebbles and small lumps, sometimes forming continuous beds and conglomerates of irregular, round, water-worn, cavernous, and fossiliferous masses, which are now and then perforated by shells, which seem to have been buried in the phosphatic mud, and the casts of which only remain. When these nodules occur in the land deposits, they have generally a pale yellowish-white or gray color, so-called land or white rock, and are often quite soft, so that they can be crushed without difficulty. Those from the river-beds, known as river or black rock, are of a darker color, and, when ground, sometimes almost black. The latter are more compact, hard, and difficult to grind, and are sometimes found in large lumps. In some of the beds these phosphatic nodules and conglomerates, constituting one third or one half of the whole bed, are associated with innumerable masses of fossil bones and teeth of land and water animals, and even with bones of man, and relics of his workmanship. Near Charleston, at the Cooper and Ashley rivers, sharks' teeth, often of enormous size, weighing from two to two and a half pounds each, are so abundant that Agassiz gave this stratum the name of "Fish-bed of the Charleston basin." At other localities, however, fossil remains are more rarely met with.

The Charleston Mining and Manufacturing Company give the average composition of their "land rock," as compiled from the analyses of many cargoes, as follows:

Phosphate of lime,	=64 —69 per cent.
Carbonate of lime,	= 7 — 5 per cent.
Sand and insoluble matter,	=12 —11 per cent.
Organic matter, (containing nitrogen equal to one fourth to one half ammonia,)	= 8 — 7 per cent.
Alkaline salts of potash and soda,	= 3 — 2 per cent.
Sulphate of lime,	= 2½— 2 per cent.
Fluoride of calcium,	= ½— 1 per cent.
Oxide of iron and alumina,	= 2 — 2 per cent.
Loss in analysis, magnesia,	= 1 — 1 per cent.

An analysis of a cargo of one hundred and forty-seven tons of phosphatic rock from Bowen's mines, by Dr. St. Julien Ravenel, of Charleston, gave:

Moisture,	= 0.30
Organic and volatile matter,	= 2.60
Carbonic acid,	= 3.75
Sulphuric acid,	= 1.60
Phosphoric acid,	=28.45
Lime,	=40.00
Sand, oxide of iron, alumina, and loss,	=23.30

28.45 per cent. of phosphoric acid is equal to 62.10 per cent. of bone-phosphate of lime.

An analysis of ground phosphate from Chisolm's Island, belonging to the Pacific Guano Company, by Dr. G. A. Liebig, of Baltimore, gave:

Moisture and organic matter, ... = 5.22 per cent.
Lime, ... =37.62 per cent.
Oxide of iron and fluorine, ... = 3.05 per cent.
Alumina, ... = 2.93 per cent.
Phosphoric acid, ... =30.99 per cent.
Undetermined matter, carbonic acid, &c., ... =20.37 per cent.

The phosphoric acid is equal to 67.66 per cent. of bone-phosphate of lime.

These analyses give an idea of the composition of the phosphatic nodules of South Carolina. They are easily soluble, even in dilute acid, and, being almost free from carbonate of lime, oxide of iron, and alumina, they furnish a very superior raw material for the manufacture of super-phosphate of lime, with a large percentage of available phosphoric acid, as will be seen from an analysis, which I have just finished, of a sample, representing about one thousand five hundred tons of so-called "national" soluble bone, manufactured by the United States Fertilizing and Chemical Company, which gave:

Moisture, ... =20.20 per cent.
Soluble phosphoric acid, ... =10.31 per cent.
Reverted phosphoric acid, ... = 2.80 per cent.
Insoluble phosphoric acid, ... = 1.40 per cent.

The sample was very fresh, and contained far more moisture than the article does, when ready for shipment. Calculating it as containing ten per cent., which is the usual quantity, the analysis would be:

Moisture, ... =10.00
Soluble phosphoric acid, ... =11.48 }
Reverted (or precipitated) phosphoric acid, ... = 3.12 } =14.60
Insoluble phisphoric acid, ... = 1.56

Or 14.60 per cent. of available phosphoric acid, equal to 31.87 per cent of bone-phosphate of lime.

Where these enormous quantities of phosphate of lime came from and where they were formed, is an open question, and several theories have been advanced in favor of one way or another. While some suppose these deposits to have been formed, in part at least, from apatite, which is contained in many of the older rocks, and which, after their disintegration, would have been brought down from the interior, together with the phosphoric acid from decaying animals and plants and of phosphate secreting animals, such as the little schell "lingula," others imagine them to be the results of gelatinous phosphates of lime derived from decaying animals and seaweeds, or of concretionary origin, or the results of secretions of marine organisms, such as sponges, ventricularie, alcyonaria, &c., &c.

I do not believe that there can be any doubt about the fact that all the phosphoric acid nodules are of animal origin only, and are in reality principally bones, perhaps in part resulting from the excrements of animals, partly after the death of the animals, of bones comminuted and ground down, and by the organic tissues agglomerated and cemented again into a pasty mass, which, by degrees, became indurated and assumed the present form.

The most rational explanation of the occurrence of the phosphatic deposits of South Carolina and their mode of formation is given by Dr. Pratt in his pamphlet above alluded to. He says:

"The phosphates of South Carolina are found to exist in the following different conditions and positions:

1. "Disseminated in well defined nodules, or in more finely divided particles, intimately mixed with the marl.

2. "In an almost continuous layer, either hard or of a semi-consolidated mass, resting, perhaps, immediately upon the marl.

3. "In the form of hard nodules or conglomerates, bedded in blue clay and sand, from four to eighteen inches thick, or more, and separated from the marl below by an intervening bed of fine sand and clay."

"Of these three conditions, in which the phosphates are found, the first two are their natural positions, and in either of these positions the phosphates become a valuable adjuvant to the fertilizing power of the marl, and it is probably due, in a great measure, to this element that the Ashley river, or more recent marls, have proved so beneficial, when judiciously applied."

"Where this substance exists as originally deposited, perhaps, as the excrements of birds, &c., in a bed on or near the surface of the undisturbed marl below, especially, if in a semi-consolidated form, sometimes met with, it may be readily mistaken, at sight, for pure white marl, whereas, analyses show, in samples of this kind, not less than sixty-three to sixty-six per cent. of pure bone phosphate of lime, and not more than five to eight per cent. of carbonate of lime. This fine, soft material is easily washed away when exposed to currents of water, and may be conveyed and re-deposited in more quiet eddies. Sometimes this superficial bed is consolidated and hard, the particles having been cemented together, perhaps, by the deposition of the phosphate of lime, formed when the soluble phosphates of the tissues and excrements came in contact with lime in solution. When in this condition they are insoluble and hard enough to resist attrition, and when underminded by currents of water, washing away the softer marl, on which they rest, these hard lumps fall to the bottom of the stream. Thus deposited, they constitute the third condition above mentioned, in which we find the phosphates, and that in which they are now best known and generally recognized, and in this form, particularly, demanded our attention."

These views of Dr. Pratt on the formation of the phosphatic nodules, largely resulting from the action of fresh water rivers on older marl-beds, by which the valuable and heavier phosphates are separated from the lighter carbonate of lime, and thus concentrated, a process which is still going on, are so very much in accord with all the observed facts, that no doubt can rest in my mind that they were really formed in this manner. The occurrence of fossils, belonging to entirely different formations, from the eocene to the most recent, and their association with bones of man and the works of his hands, could not rationally be explained in any different way.

After having given in the above a short statement of the occurrence of the phosphatic nodule deposits of South Carolina, I will conclude by adding a few statements, showing the magnitude of the business which has been created within a few years by their discovery, and in which over six millions of dollars are now invested in works and machinery for their removal and preparation.

Up to July, 1872, over two hundred and six thousand tons of phosphatic rock was shipped, of which over ninety thousand tons went to foreign ports. In addition to which more than thirty-six thousand tons were manufactured at the place into fertilizers, or, in all, over two hundred and forty thousand tons.

According to the circular, dated June 12, 1877, of E. Willis, of Charleston, the following quantities of phosphatic rock were consumed at home, and shipped to foreign and domestic ports:

	1874.	1875.	1876.	1877.
Foreign ports,	52,545	70,546	75,815	102,767
Domestic ports,	41,000	32,560	38,231	47,053
Consumed,	15,795	19,684	15,580	13,400
Total,	109,340	122,790	132,626	163,220

In Riordan & Dawson's "The Commerce of Charleston, 1877–78," of September 2, 1878, the following number of tons are said to have been consumed at home, and exported to foreign and coastwise ports:

	From September 1, 1876, to August 31, 1877.	From September 1, 1877, to August 31, 1878.
Local consumption,	13,000	20,000
Foreign ports,	115,100	114,835
Coastwise ports,	56,593	56,143
Total,	184,693	190,978

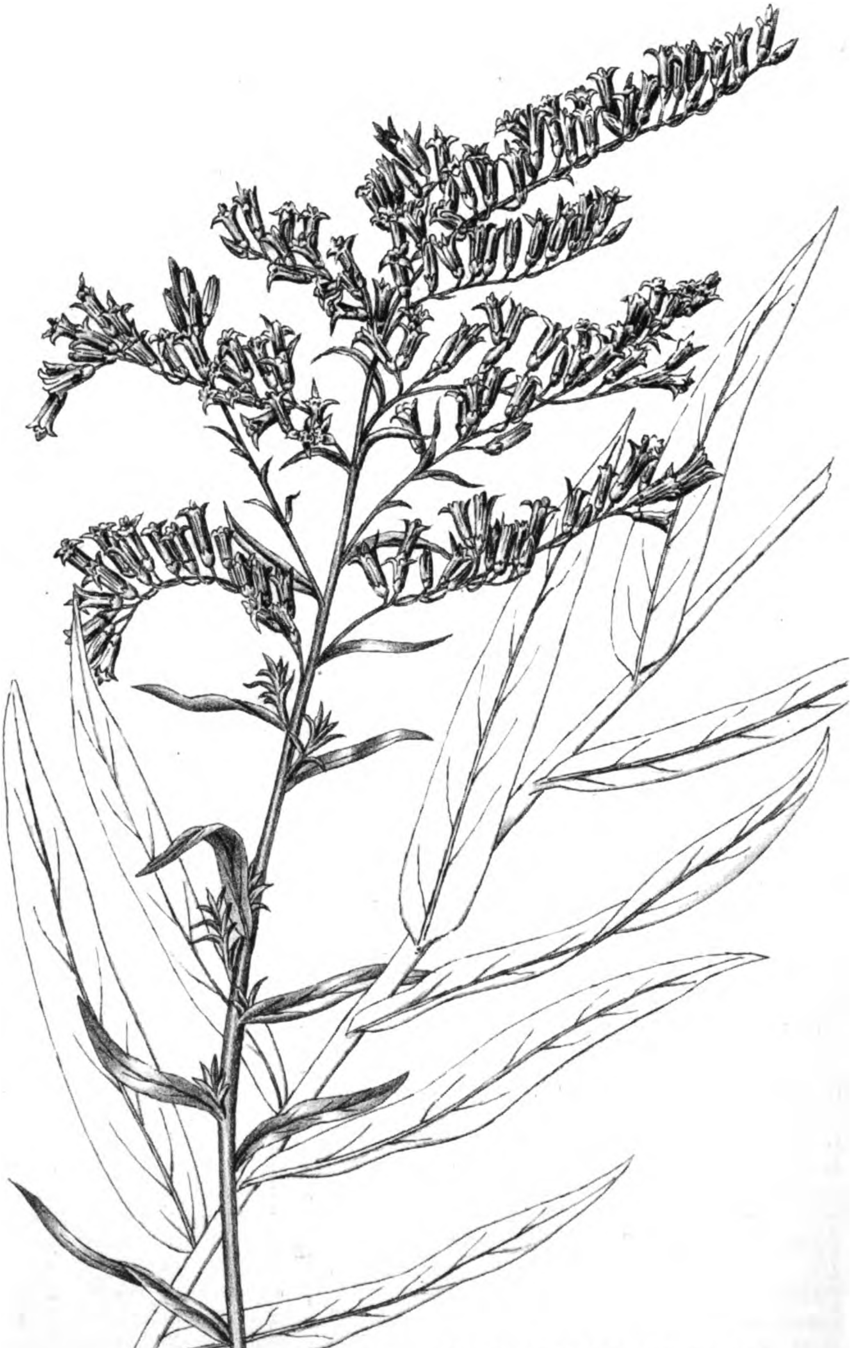
Before closing, I must acknowledge my obligations to William M. Hall, Esquire, secretary and treasurer of the United States Fertilizing and Chemical Company, who has kindly furnished me with valuable documents, which alone have enabled me to prepare the above paper, which, I trust, may be of much interest to our farmers in showing the enormous dimensions which the trade in phosphates has assumed within such a short period of time, by the conversion of a raw material, which had been considered worthless, into valuable fertilizers, returning to their lands the constituents so essential for the production of large crops.

REPORT OF THE BOTANIST.

To the Secretary of the State Board of Agriculture:

The matters brought to my attention as Botanist to your Board, during the past year, have not been numerous, but are invested with some interest to the intelligent farmers of the State.

In my first report I noted the introduction into the State of the "field morning glory"—known as the "lily," by English farmers—and as *Convolvulus arvensis* by botanists. I have not had brought to my knowledge any further notice of its existence, but in the adjoining State of New York I find it spreading very rapidly. It would prove to Pennsylvania farmers a far worse pest than the celebrated Canada thistle is to the farmers of the



SOLIDAGO ODORA.
(Sweet scented Golden-rod.)

eastern States, and it would save immense labor and expense hereafter if agriculturists will make themselves acquainted with it, and eradicate it on the first appearance of the plant on their grounds. The only way to do this is by digging down and taking out every piece of the cord-like roots. Even with the greatest care some little piece may be left to grow, and which would soon raise another brood to stock a large area. The spot where it may appear should, therefore, be examined several times during the season. Though it takes several days' work to stop these small beginnings, it will be labor well spent, for when once a field becomes over-run with it—as I have recently seen in New York—it will have to be abandoned foı many agricultural purposes.

One correspondent sends a grass for name, which he believes will prove very valuable as a damp-meadow grass; as it seemed to yield enormously in such situations. This proved to be the common "soft-grass"—the bluish-grey grass with rosy inflorescence common along wet places, and which, though yielding largely, is believed by hay feeders to be unacceptable to cattle.

Another correspondent sends a sample of what he calls "Pennsylvania Jute," and which he believes could be brought into profitable competition by Pennsylvania farmers with the celebrated Asiatic article. This was found not to belong to the corchorus or "jute" family, but was the common "Indian mallow" of our corn-fields—*Abutilon Avicennæ.* By testing with a weight the fiber was found to be much weaker than that from the true jute plant. A large number of plants have fiber good for mechanical purposes. Pennsylvania abounds with them. Improvement is rather needed in machinery which may cheaply prepare it for use.

Inquiries have been frequently made, as to the best varieties of mulberry for silk worm feeding, and their adaptation to the soil and climate of the State. This, in the main, is a question for those actually engaged in silk culture, and can be decided only by experiment. The *Morus alba*, commonly called the Italian, though really a native of Japan, is the kind in general use, and has become naturalized in many parts of eastern Pennsylvania, thus showing its adaptation to our State. It varies very much from seed, as all other fruit trees do, and though it is not the *Morus nigra*, the black mulberry of English gardens, it occasionally has trees bearing black fruit. The flowers are of separate sexes on the same tree, and one variety, known as the *Morus multicaulis*, has flowers wholly male, and must always be raised from cuttings, as it has no seeds, and hence, if the trees at any time become diseased, such disease is likely to be carried with the cutting to the new plant. Trees of this kind are usually diseased, strong branches dying suddenly in May or June, after the leaves have been formed, and it is believed that this disease communicated to the insects fed on leaves from such trees, have had much to do with making silk experiments futile. Trees from seed often exhibit traces of the disease. Such should be weeded out, and new seedlings made to take their places. This will, perhaps, be of more importance than any question of mere varieties.

A particularly interesting matter was brought to my attention by Mr. N. Dundore, of Philadelphia, and subsequently by several correspondents of Lancaster county. It was in the form of "tea," which is largely in use in Berks, Bucks, and Lancaster counties, and has become an article of considerable local trade there. This is gathered in the mountains, and is said to be supposed by many to be a species allied to the real Chinese tea. On examining the dried leaves sent to me, I found they belonged to the sweet scented golden rod—*Solidago odora* of botanists. This has been known since the time of Purst, and other early botanists, to be occasionally used as "tea," just as many other plants are so used occasionally. But of mere "herb teas" people soon tire. It is only when the herb contains some stimulating property, that the desire for it increases, and its use becomes general. On testing the "tea" with some critical friends, it was pronounced very good "herb tea;" but with the tastes formed by continuous use of Chinese tea, coffee, and other beverages in common use, it was natural that no especial desire to continue its use should be evinced. Learning, however, that it had been in continuous use for many years past in the counties named, I concluded that there must be more merit in it than any mere herb tea would possess. I had the balance of the leaves submitted to Mr. Edward Goldsmith, of the Academy of Natural Sciences of Philadelphia, the distinguished analytical chemist, who has strong reasons for believing it possesses an amorphous alkaloid, the quantity being too small for a more definite decision. A large bundle of fresh leaves which I engaged a friend to collect and send to Mr. Goldsmith, proved not to be the species, and were not submitted to analytical tests, therefore—a fact I did not know until too late to remedy for this report. All the so-called "teas" that have been brought to notice as natives of Pennsylvania, have not advanced beyond a mere herb tea, and I was prepossessed against this on its first introduction to my notice; and I am therefore the more pleased to express the opinion now that there may be some commercial value in this plant.

It is thus described in Darlington's *Flora Cestrica:*

"Stem striate, pubescent in lines; leaves linear-lanceolate, acute, entire, smooth, pellucid-punctate, scabrous on the margins; racemes paniculate.

Stem about three feet high, simple, rather slender. Leaves one or two to four or five inches long, scarcely narrowed at the base, sessile. Heads of flowers in secured racemes, which are mostly spreading or recurved, and form a terminal pyramidal panicle; involucre smoothish; scales lance-linear; rays oblong or ob-lanceolate; achenes hairy.

"Borders of woods and thickets; not common.

"This is an agreeably fragrant and rather pretty species."

In order that this species of golden-rod may be more readily identified, I have had a drawing prepared to accompany this report.

The species is not confiend to the low mountains of Pennsylvania, but is found in New Jersey and most of the States in the eastern or Atlantic portion of the United States.

Besides minor matters that have received individual attention, the Botanist has brought to the attention of the Board in his address to the latest views in vegetable biology, bearing on variations of form, believing that, when properly understood, they will be of immense practical importance, especially to those engaged in the improvement of races or the production of new forms.

THOMAS MEEHAN,
Botanist of the Board.

REPORT OF THE MICROSCOPIST.

ROPY OR VISCID MILK.

By HENRY LEFFMANN, M. D., *Microscopist of the Board.*

[NOTE.—As was indicated in our last annual report, the investigation into the cause of and remedy for "ropy" or viscid milk has been continued by Dr. Leffmann, the Microscopist of the Board. This year there were very few cases reported to the Secretary, and it is possible that the prevailing cause may have been absent. In reply to letters of inquiry, numerous theories have been developed, most of which pre-suppose fungoid origin for the trouble; but as none of them will satisfactorily account for all of the phenomena noted by our microscopist, none of them have been accepted. In order, as far as possible, to assist in the investigation, letters of inquiry were addressed to leading veterinary and dairy authorities, from whose replies we select the following, and regret our inability, through want of space, to give more.]

The investigations into the nature and prevention of "ropy milk" have been continued during the present year. At the farm of Mr. H. J. Smith, (George's Hill, Philadelphia,) the trouble appeared early, but at no time could I obtain samples showing more than slight ropiness. At the Westtown farm no difficulty occurred, although the managers of the farm kept a close watch. Judging from the wide publicity which the Secretary of the Board gave to the official investigation and the few communications that I have received on the subject, I infer that the difficulty has been comparatively rare this season.

One farm, however, suffered severely. During the first week in August, milk was sent to me from the farm of Daniel Stauffer, near Limerick station, Montgomery county, Pennsylvania. The sample was quite fresh when I received it, and showed a marked ropiness, it being possible, with care, to draw out a thread six or eight inches long. I visited the farm and found the usual conditions, nothing presenting either in location, water supply, stabling, etc., which could be fixed upon as a cause of the trouble. Fourteen cows were in service, and samples of milk were taken from each one, and put in separate bottles. These were kept in my laboratory for about forty-eight hours. It was hoped that some differences in the tendency to rope might be observed, and thus lead to the identification of some cows as the source of the trouble. No such differences could be detected. Considerable variation was noticed as to the amount of cream thrown up, but the quality of the cream was uniform.

The microscopical examination of strongly ropy milk, shows a tendency on the part of the milk globule, to aggregate in chains. I can detect no odor or taste peculiar to the condition, and although some persons have mentioned such properties, the general opinion accords with my own.

I expressed myself last year as opposed to the theory which ascribes the trouble to the growth of a fungus; my observations this year have confirmed me in this opposition. I have, of course, no doubt that fungus growths could be, and, indeed, would be often found in milk. I am forced, however, to the view that such forms are coincident and not causative.

The primary trouble is, I think, in the animal furnishing the milk. The oil globules become changed; the albuminous covering becomes adhesive, perhaps, by partial decomposition. This covering is, doubtless, not perfectly formed, and is incapable of resisting the decomposing influences around it, hence, after the lapse of some hours, we have the adhensiveness developed.

Those who favor the fungus theory, assign various sources for the *fungi;* among others, impure water and barn-yard refuse. I pointed out, in the report of last year, that ropiness had occurred on one farm on which the water was excellent, and at another on which the stabling arrangements were exceptionally good. I am happy to add, that the experience at this latter farm, during the present year, has been wholly against the "dirty water" theory. The cattle drank more of a certain contaminated water this year than last, and have been entirely free from milk troubles. While, therefore, I incline to the view that the trouble is primarily in the cow, I am not yet in a position to define the nature of that trouble. It may be only a temporary disturbance of the secretions. Some farmers think that trouble always begins about harvest time, and that certain weeds which come into promiennce about that time are to blame for it; but against this view we have the early occurrence on certain farms.

The question now arises as to remedies. I expect to give elsewhere in this report some general directions in regard to the preservation, &c., of milk, but I append here a few remarks which will be specially applicable to this subject. Upland pasturing, and the use of saltpeter, even in large doses, will not prevent, although they may palliate. This was proved at Mr. Stauffer's farm, where both these means were employed, and yet some ropiness continued. I recommend that when marked ropiness appears on a farm, an attempt be made to discover what cows are affected. To this end a small amount of milk should be collected from each cow, and kept in the spring-house, with the main body of the milk. If any differences were noticed in the samples, the milk of the cows giving the ropiness should be kept separate. Such a method might be a little troublesome, but would, I think, be well worth trial. Further, I suggest that modifications be made in the periods of milking, in such a way as to diminish the time which elapses before the milk reaches the consumer, and hence before the ropiness can develop. Last year this plan was used with much success on a farm near the city. At the Westtown farm, this year, the managers have milked in the cool of the evening, instead of at three o'clock, as was done in years previous, and it is believed that this change was beneficial. During the course of this winter I intend experimenting with a view of discovering some agent which can be used for partially coagulating or hardening the albuminous envelope of the milk globule, as I think such a treatment would materially diminish its tendency to become adhesive.

Prof. James Law, of Cornell University, Ithaca, New York, writes as follows:

"The 'ropy' character of the milk appears to be due to the presence of some modified form of albumen, or other nitrogenous substance. That it is not the natural *albumen* of the blood is sufficiently evident, for the milk does not coagulate, by boiling, as does that of the first few days after calving. That it is not fibrine, or rather its antecedents fiburlogen, fibro-plasten, &c., is equally patent, as there is no tendency to spontaneous coagulation in any varied conditions. It belongs, apparently, to the class of *metalbumens*, which are closely allied to the ordinary albumen in composition, but many of which, like that found in the horse's urine in disease, do not show the usual chemical reactions with heat, acids, &c., &c. It has not been determined whether, in all cases, this metalbumen is derived from the nitrogenous element of the milk—casine—or whether it is directly secreted from the blood, and due to some changes in that fluid, or in the secreting follicles of the mammary glands. In some cases it appears to be effected in the blood, or in distant diseased tissue, as in the case of metalbumen in the horse's urine, in connection with inflamed lungs, and when there was no manifest disease of the kidney. In some cases of "ropy" milk, there is a hot, tender congested, and knotted feeling of the udder, which might lead to the suspicion that the morbid process is concentrated there. We should, however, bear in mind that disorders in distant organs of the body, as above mentioned, and in the blood forming processes, often lead to the passage of albumen and its cogener (metalbumen) in the urine, and that simple congestion of the kidneys leads to the same result. It follows that the passage of albumen and its allies by the udder, may equally depend on very different disorders, near or remote, and therefore must go the mere presence of the element to find the true cause of the trouble. It remains further to be determined, in every case, whether this change into albumenous material has been effected by the agency of the fungi existing in the blood, in the secreting follicles of the udder, or in the milk after it has been removed from the udder. In the case presented in my report, it is quite evident that the material was produced at the expense of the nitrogenous elements natural to the milk, for the addition of water and blood, respectively, to pure specimens of milk brought about the condition as speedily as if the milk had been derived from the affected cows. The diseased milk, moreover, had the most natural appearance when first drawn, and only altered when the fungi vegetated on the surface exposed to the air."

Judging from this instance, therefore, we may easily conceive of the "ropy" milk being dependent in certain cases on the lack of perfect cleanliness, or of final thorough scalding of the milk dishes. It must be remembered that perfect safety demands that the dishes be scalded and turned up to dry, and that the slightest contact of a solid body with their interior may deposit germs which will determine this and other changes in the milk. In the same way the trouble may come from uncleanliness of the udder or of the hands of the milker.

On the other hand, the metamorphoses of albuminuria products may take place within the body, in connection with other derangements, and entirely disconnected with the action of *fungi*, as in albuminuria in the horse; and in such cases, unless dependent on a diseased udder, we would expect to find albumen in the same condition in the urine as well as in the milk. In such cases, too, the milk might be expected to be drawn "sizy" and not simply to become "sizy" after standing.

Every appearance of "ropy milk" in a herd or locality will demand a special investigation; but a few well directed experiments on a succession of cases in different outbreaks, would give us to know better the varied causes of this troublesome condition.

Hon. X. A. Willard writes thus:

"In regard to 'ropy milk,' there are several causes which operate to produce it, some of the most prominent of which I will name. The cows drinking bad water in hot weather, such as comes from stagnant pools, or where it is strongly impregnated with filth, either animal or vegetable matter, in a decomposing state. This is a fruitful cause of trouble in hot weather, and I have known it to cause the trouble when good water was in the field in out of the way places. The germs of decomposition are conveyed through the system to the milk, which begins to decay or spoil in the bag before it is drawn, and especially during hot weather, when the trouble is aggravated by overheating the blood, by exercise, or by exposure to the hot sun, fast driving from or to the pasture, worry from dogs or flies, or indeed, worry from any cause. Meal tainted with mould, distiller's slops, &c., and all this class of food when fed in considerable quantities during hot weather, have been known to cause the trouble. The remedy, in cases coming under my observation, consists in providing the cows with clean, sweet food, (good grass,) and if extra feed is required, using bran or shorts, rather than corn meal or other heavy ground grains in hot weather. Extreme care in not over-driving or over-heating the animal, providing ample shade so as not to expose too much in the hot sun, an avoidance of everything that worries, a plentiful supply of salt regularly, and kindness in milking.

" Cows often drink from stagnant pools, and of water that is bad, when good water is provided in pastures and fields. I have an instance of serious disease in a family, all caused by the cows drinking from a slough near the barn, although they had an abundance of good water in the pasture."

REPORT OF THE ENTOMOLOGIST.

INSECTS INJURIOUS TO CORN.

By Prof. W. A. BURKHOUT, *Entomologist of the Board.*

So wide-spread and succulent a plant as our Indian corn would naturally be supposed to have many insect enemies. The supposition is well-founded; its rapid growth and generally vigorous nature are often unable to secure that uninterrupted and symmetrical development which is necessary to a perfect yield, for the simple reason that so many insects stand ready to encounter it at every stage.

There is no time, from the dropping of the seed into the ground in the spring to the harvesting in the fall of the year, when it is out of danger; indeed, not when stored in the crib or meal-chest is it strictly safe. Constant vigilance is necessary to its production, and to its preservation also. The roots, the stems, the leaves, the flowers, and the maturing grain are alike prayed upon by some few or many species of insects, which are represented by few or many individuals, according to the favorableness of the season, the number of parasites, and the activity with which war is waged against them. Our corn crop fails from various causes. Sometimes it is due to unfavorable weather and circumstances of a like nature over which we have no control; but too often it is owing to the ravenous insects which blight or destroy that which would otherwise yield a handsome return. Many of these insects are " old soldiers." They have been before the public for a long time. For a number of years they may be so few as to appear to be becoming extinct, but, with a new year, they suddenly spring up here and there with such vigor and in such numbers that to put them down requires the most active measures; others, again, are new importations, migrants from another part of the country, like the now familiar Colorado potato beetle; still others are species heretofore considered harmless, but now, by force of circumstances, become noxious species. Of whichever kind they may be, the farmer is concerned with knowing how to overcome or prevent their attacks. This paper does not profess to be a detailed account of all the insects which are known to feed upon our Indian corn. That would be too ambitious a task. Rather is it my purpose to present a brief history of some of the commoner families of insects which are injurious to corn, describing one or two examples of each, and figuring, so far as possible, some well marked ones, in order that the farmer may be better prepared to recognize these foes of our most valuable cereal, and hence act intelligently in endeavoring to destroy them. An acquaintance with the habits, and general life history of some insects, has exposed their weak points, and shown when and where, and by what means they may be attacked, with a reasonable prospect of so diminishing their numbers, as to render them practically innoxious, and in every case a knowledge of the life history of an insect renders our control over it more sure and certain.

No sooner has the seed corn been placed in the ground, than it is liable to be attacked by the wire-worms. Their appearance is well indicated by this popular name. Long, slender, and rounded yellowish worms, they could hardly be mistaken by any one, and many of the reasons given for the failure of corn to come up evenly, such as the "cold weather," "poor seed," &c., are incorrect ones; the wire-worms are the trouble. They eat out the grain often before it has had time to germinate, and for some time after the young plants have started up, the wire-worms feed upon their roots, thus weakening them, and in some cases destroying the corn entirely. These wire-worms are the young or larvæ of what are generally known as "Spring beetles," (Elateridæ.) There are many different species, which are more or less alike when in this earliest worm-like stage, but which produce very distinct beetles. They are supposed to live in the larva state several years, growing very slowly, and are vegetable feeders; consequently, they are more or less injurious during that time. When mature, they are for the most part, inconspicuous insects, timid, of dull color, and are found hiding within the tassels of corn or upon other plants. Their popular name is derived from the ease with which they spring into the air when placed upon their backs. They are enabled to spring several inches in this way, and in falling, generally manage to light upon their feet. A peculiar spine and groove upon the under side of the body, are the instruments by means of which this springing is effected. In this mature state, they do little if any injury to vegetation. Fig. 1, represents a wire-worm. Fig. 2, a spring beetle.

I am not aware that any completely satisfactory plan has been devised for destroying wire-worms on a large scale. Various means have been tried, but with very uncertain success. Working under ground, so as to be invisible, and moreover, having a decidedly tough and impervious skin, they are very difficult to reach, and also very difficult to destroy, at least by any means which is at all practicable outside of small gardens. A great many are doubtless eaten by our insectiverous birds and mammales, and when very troublesome, it has been recommended to let the field lie fallow for a year, or to plow it several times in the season, so that the worms are disturbed and their food destroyed. If plowed late in the season, the worms are liable to be killed by freezing. Some farmers are confident that soaking the seed in different chemical solutions, copperas, for instance, or tarring it, will protect it from wire-worms. Others testify that it makes no difference, unless it be to stimulate the plants to a more active growth, thereby putting them out of the way of these pests.

The different species of cut worms—of which, by the way, there are very many—are all injurious to young corn and other plants. They differ but slightly to the ordinary eye in appearance and habit. Some of them, however, are more partial to corn than are others. Some cut the stem under the ground, some slightly above it. Of the latter a common species is the striped or corn cut-worm, (*Agrotis tessellata*, Harris,) (*A. Maizii*, Fitch.) According to the last author, the larva is cylindrical, usually about an inch in length when disinterred beside plants in our gardens and corn-fields, upwards of an inch and a quarter when fully grown. Ground color, dirty white, or ash gray, occasionally slightly tinted with yellowish, the top of its neck shining black, with three white or pale longitudinal stripes; a whitish line along the middle of the back between two dark ones; on each side three dark stripes, separated by two pale ones, whereof the lower one is broader; all the under side below this, dull white. Head and neck shining black; legs mottled with brown. In June it is found severing the young Indian corn and other plants, half an inch above the ground by night, and by day hiding itself slightly under the surface. The moth into which this cut worm transforms is thus described: Fore wings, dark ash colored, and exhibit only a faint trace of the transverse double wavy bands; the two ordinary spots are large and pale, alternate with a triangular and square deep black spot; there is a smaller black spot near the base of the wing. The hind wings are brownish gray in the middle and blackish behind. It expands one inch and one quarter. The moths appear about the 1st of July, and the eggs are soon after laid on the ground, at the roots of grass, weeds, or other vegetation, upon which the young are to feed the rest of the season. By the time the frosts and cold nights of fall occur, the worms are about half grown. They now descend several inches into the ground, where remain torpid during the winter, to come forth when the warm days of spring, that have started vegetation, have also warmed them into life. The moth of this striped cut-worm is shown in Fig. 3. All of these cut-worms are dull and greasy looking, rather fleshy and furnished with sixteen legs, six of which are true legs, eight prop legs along the middle of the body, and two anal legs at the posterior. Fig. 4, shows a good example of the kind. For the most part they feed under-ground, but some climb into branches of trees and do much damage there. Some drag pieces of leaves into their burrows so that they can feed at their leisure. The injury done by them is principally at night. When full grown, they work their way into the ground, where they undergo their transformations into chrysalids. The chrysalids of the first brood appear as moths within a few weeks. Most of the broods of later in the season pass the winter as chrysalids. The moths, for the most part, fly at night, and during the day they may be found in crevices, under the bark of trees, in cracks of boards, and similar situations. At night they are attracted by light, and the moth which fly about our lamps during summer and early autumn are principally these cut-worm moths. They can pretty readily be distinguished from others by their dull and sober colors, mostly grayish or grayish black, with a few simple whitish dots or lines. A close examination with a glass shows them to be covered over with fine silvery or pearly scales which a little rough handling causes to drop off. They then look very ragged. By constant beating against a lamp their wings become smooth, and frayed out on the edges, and their heads bald.

Cut-worms are more or less subject to the attacks of other insects, and

PLATE I.

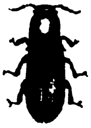


Fig.2.

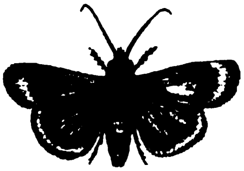


Fig.3.

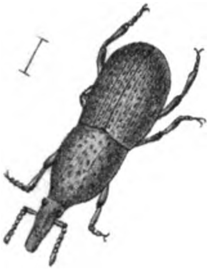


Fig.8 a.

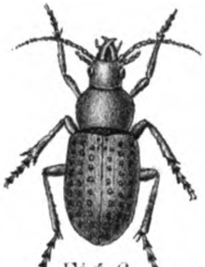


Fig.6.

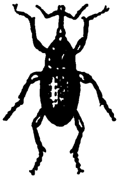


Fig.8.

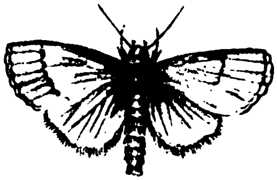


Fig.7.

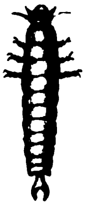


Fig.5.

Fig.1.

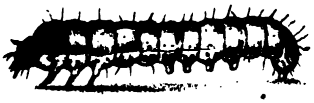


Fig.4.

Fig.1 Wire-worm.
" 2 Spring-beetle.
" 3 Moth of striped cut-worm, *(Agrotis tessellata)*.
" 4 Cut-worm.
" 5 Cut-worm lion.

Fig.6 Beetle of cut-worm lion, *(Calosoma calidum)*.
" 7 Moth of spindle-worm, *(Achatodes zeae)*.
" 8 Sphenophorus zeae, corn weevil.
" 8ª Sitophilus granarius, grain weevil.

were possible these parasitic forms should be protected and encouraged, because of their great benefit in destroying these and other injurious insects.

Different species of flies, bugs, and beetles have been known to infest the cut-worms. In the Illinois Entomological Report for 1877, it is said "the fiery ground beetle, (*Calosoma calidum*, Fabr.) in the grub or larva is so ferocious in its attacks on cut-worms as to have obtained from Dr. Shimer, the name of cut-worm lion. These larvae, which are represented by Fig. 5, are flattened, of a black color, have six legs near the head, and a pair of strong jaws extending in front. They will pursue the cut-worms to their underground retreat, and seize them wherever they can find them, a cut-worm lion sometimes attacking and killing a cut-worm as twice as large as itself. The beetle, which is shown in Fig. 6, is black, about an inch long, with three rows of coppery spots on each wing-case. It is probable that there are other species of the ground beetle which have a similar habit."

Fall plowing would seem to be worth trying in cases where some measures seemed positively necessary. If done so late that the worms are sluggish or dormant, the frost would kill large numbers of them, and the crow and insectiverous birds and animals generally would pick up many more.

Somewhat nearly allied to the corn cut-worm is the spindle worm, (*Achatodes zeae.*)

This worm was first described by Dr. Harris, in his "Insects Injurious to Vegetation." It receives its name from the habit of eating into the young plant and destroying the spindle shaped stem whose leaves, by their withering, show the presence of the intruder. There are a number of these stalk borers, and several of them attack corn. The spindle worm "grows to the length of an inch or more, and to the the thickness of a goose-quill. It is smooth and apparently naked, yellowish, with the head, the top of the first and of the last rings black, and with a double row across each of the other rings of small, smooth, slightly elevated, shining black dots.

The chrysalis which is lodged in the burrow, formed by the caterpillar, is slender and shining mahogany brown, with the anterior edges of four of the rings of the back roughened with little points, and four short spines or hooks turned upwards on the hinder extremity of the body." The moth of this chrysalis is represented in Fig. 7. "The fore wings are rust red; they are mottled with gray, almost in bands uniting with the ordinary spots, which are also gray and indistinct; there is an irregular tawny spot near the tip, and on the veins there are a few black dots. The hind wings are yellowish-gray, with a central dusky spot, behind which are two faint dusky bands. The head and thorax are rust-red, with an elevated tawny tuft on each. The abdomen is pale brown, with a row of tawny tufts on the back. The wings expand nearly one inch and a half." These spindle worms can be picked out from among the leaves of the stem and destroyed. Their presence will be indicated by the withering of the leaves and the round hole in the stem by which they have entered.

Of late years, and in some localities, young corn has been badly injured or destroyed by a small snout-weevil, (*Sphenophorus zea*,) Fig. 8, which punctures the stem near the ground with many holes, like those made by a pin. The corn curculio was first described by Mr. Walsh. "It is oblong, oval, and sub-cylindrical; the length about one third of an inch, exclusive of snout; the width about two fifths the length. It is of a brownish black or black color, the punctures being more or less filled with pale yellow or grayish powder, the thorax having on the middle a diamond-shaped, polished space. The snout is about one third of the body, and very slender." It has thus far been found more abundantly in the neighborhood of lakes and rivers, and there is good evidence to show that it breeds in water-soaked wood. It has been found in great abundance on the shore of Lake Michigan, near Chicago, by Prof. Riley. The larva is not known to injure corn. The injury, as far as has been observed, is done by the matured beetle, which secretes itself just beneath the surface soil, where it may be found during the day firmly attached to the plant.

Those who have been troubled by this weevil should report the fact, so that its life-history can be more satisfactorily determined, and experiments made for the purpose of showing the best method of destroying it. From what is already known, it is more likely to appear, at least injuriously, in moist situations, or in fields adjoining water. It has been suggested that lime or guano, applied as is plaster, would perhaps drive them away. The weevil family to which this little beetle belongs has given us some of our most troublesome insects, such as the plum curculio, the apple curculio, and the many small beetles which may be known by their elongated probosces, with which they can easily penetrate stems and seeds in order to feed or make a place for depositing their eggs. *Sitophilus granarius*, the grain weevil, destroys wheat and corn in the granary. It is figured by Fig. 8*a*. It multiplies with alarming rapidity, and its larva eats out the grain, so that only the shell remains. It sometimes becomes so troublesome that the old granary has to be abandoned for a year or two, and the grain stored somewhere else until the weevils are starved out. Frequent stirring of grain, or passing it through a fanning-mill, are the principal means employed by those who have had experience in the matter. In this way the grubs or larvæ are separated, and can then be destroyed.

It is a well known fact among both entomologists and practical cultivators that our injurious insects are, from time to time, recruited by some which have always been considered harmless, either because of their habits or their small numbers, from which it seemed impossible for them to accomplish any considerable injury. Nature has placed various checks and balances upon the over-production of every species of life. Let these checks and balances be removed, or even but slightly altered, and many species before insignificant in numbers, and consequently, in destructive power, increase enormously and over-run their natural bounds. Thus it becomes necessary for them to migrate in order to find food, and our locusts and Colorado potato beetles are the result of this migration. Witness, for instance, the case of the common "walking-stick," (*Diapheromera femorata*,) well known in Pennsylvania. It has heretofore been considered a harmless insect, has been found only in small numbers, and was never known to do injury worth speaking of.

According to Prof. Riley, within a few years it has appeared in extraordinary numbers upon oak and hickory trees in Yates county, New York, despoiling them of their leaves, and in some cases causing them to die. It wants only a like favorable opportunity to prove as disastrous in many other localities. Mr. Frederick Jaekel, of Hollidaysburg, Pennsylvania, writes me, under date of July 19, 1879, that he lost nearly an acre of lupine, (*Lapinus lutens*,) upon which he was experimenting as a substitute for clover, by the attacks of a blister beetle which proves to be cantharis, (*Lytta*,) cinerea.

Thus does some annoying insect appear in extra force to blight the prospects of the careful cultivator who is greatly surprised that something almost unknown or unnoticed before should prove so destructive. Many instances of this kind could be cited. One is in place in this enumeration of insects injurious to corn. It is the corn-plant louse, (*Aphis maidis*, Fitch.)

The plant-lice are well known small, greenish, and waxy looking insects.

PLATE 2.

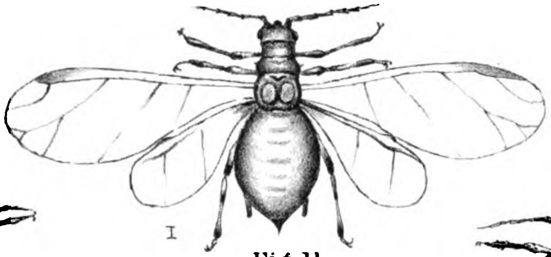


Fig.11.

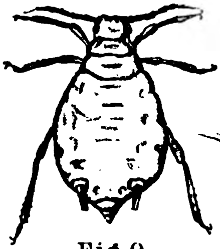


Fig.9.

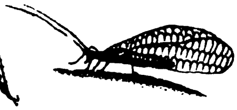


Fig.12.

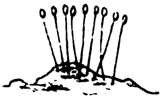


Fig.13.

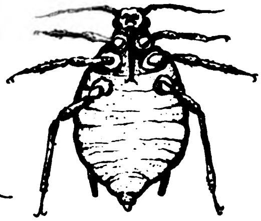


Fig.10.

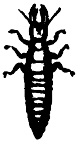


Fig.14.

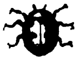


Fig 15.

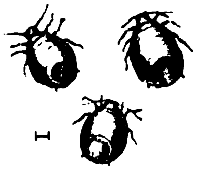


Fig.21.

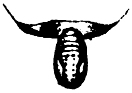


Fig.17

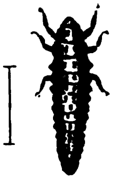


Fig.16.

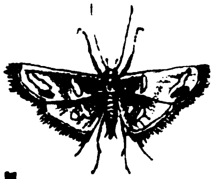


Fig.23.

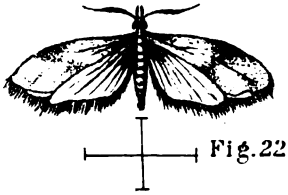


Fig.22.

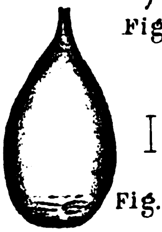


Fig.18.

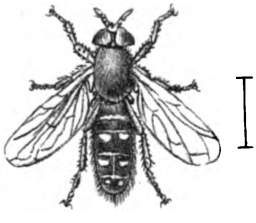


Fig.20.

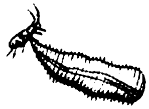


Fig.19.

Fig. 9 Aphis maidis Corn plant-louse, upper side.
" 10 " " " " " under "
" 11 " " " " " winged form
" 12 Lace-winged fly (*Chrysopa*).
" 13 " " " eggs.
" 14 " " " larva.
" 15 Lady-bird.
" 16 " " larva.
" 17 " " pupa.

Fig. 18 Sweat-fly pupa.
" 19 " " larva with plant-louse.
" 20 " "
" 21 Plant-lice that have supported ichneumon parasites.
" 22 Tinea zeae-Fitch.
" 23 Pyralis farinalis.

They belong to the section homoptera, (similar winged,) of the family of hemiptera, (bugs,) and a very large number have been described. They are remarkable for their very rapid production, by means of which a small number will in a short time spread to considerable distance. They are injurious, principally because they suck the juices of the plants upon which they live, and thereby diminish their strength and vigor. They do a greater injury to young plants, and, if I am not greatly mistaken, when they take their station on the roots. The presence of plant-lice is generally betrayed by the ants, which are very quick to find them in order that they may feed upon the honey which the lice exude from two honey tubes situated upon the posterior of the body. The corn-plant-louse was originally described by Dr. Fitch, of New York, but has since been described and figured by several authorities. Figs. 9, 10, and 11 represent this species. Fig. 9 shows the wingless female, upper side; Fig. 10 the same, lower side; Fig. 11 a winged female fully grown. Formerly these plant-lice were supposed to live only upon the short stem which supports the ear, but this is now known to be an error. They occupy this situation principally, though not exclusively, during the latter part of the season, but earlier they may be found upon other parts of the plant. I found them in June of the present year upon the roots, and the plants were yellow and withered because of the loss of sap, which would be most seriously felt at this stage in growth. The following from the Illinois Entomological Report, 1877, shows the danger to which we are subject by them:

"On the 19th of May, one of my neighbors came to get me to go and examine a field of corn that he said was being destroyed by something, and he could find nothing that could account for it. I found the corn about three inches high, and hundreds of hills withering and dying, and, on careful examination, I found the roots and base of the culm below the ground literally swarming with aphides, (plant-lice.) I think from some hills I could have gathered a teaspoonful of the little creatures. I estimated about one fifth of the stand of corn in that field to be destroyed by them There had been a crop of rye raised on the ground the season previous. I had before seen slight injury from aphides, but nothing to compare with this."

The larvæ of the corn-plant louse are of two kinds. One is a clear light green; the other a faint yellowish green. These latter become reddish or coppery in color, and upon the sides of the body appear slight projections, which are rudimentary wings. Eventually the head and thorax become black, and the abdomen a pale greenish yellow, with more or less of black dots along the margin. The legs are blackish near the joints, the intervening spaces being light colored. The antennæ are about half the length of the body. The beak or sucking organ is short, and, when not in use, lies folded upon the breast, its tip extending about to the base of the fore legs. The wings are carried erect when they are at rest, very much as in the butterflies. They are transparent, and the veins show very distinctly. The honey-tubes are black and prominent, reaching half way or more to the tip of the abdomen. These winged individuals are fewer in number than the others. The first mentioned light green larvæ become, when full grown, a bright green color, except the very front of the head, which is black. The segments just back of the head have each a short blackish band, which is sometimes also the case in the abdominal segments. Slight dusky spots are to be seen in two lines, one upon each side of the abdomen. The body in the very young individuals is rather slender, and the sides are about parallel with each other. As they grow older, it becomes elliptical; at length, swollen and distended to an obovate form. The antennæ are seven jointed; the third joint is the longest. The honey-tubes are black and very prominent, especially in a view of the under side of the body.

In a colony of plant-lice all of these kinds can generally be seen. With beaks extended, and thrust into the soft stems and roots of the corn, they suck its rich juice, grow, and reproduce their kind with astonishing rapidity.

The instance already cited shows that they are capable of entirely destroying a field of corn, were they permitted to increase sufficiently. Various are the natural means by which they are held in check. In walking through the corn fields in August, I have been surprised at the number of lace-winged flies (*Chrysopa*) that I have seen. They are small, slender-bodied, four-winged insects, less than one half an inch long, with very bright and prominent globular eyes; for which reason they are also called golden-eyed flies. Their wings are large for the body, and most delicately and beautifully reticulated by the numerous veins which have determined the name lace-winged. These flies—which are really four-winged insects, and hence entirely different from the two-winged flies (*Diptera*)—lay their eggs upon the leaves in a very peculiar way. They are elevated upon little thread-like pedicels, so that each egg stands a quarter of an inch or so above the leaf. A cluster of these eggs has the appearance of a patch of mildew, and is commonly mistaken for a vegetable growth of some kind. The larvæ hatched from them are called aphis-lions, and are very voracious, eating the eggs and young of various insects, particularly the plant-lice. This is one means by which the aphides are kept from unduly increasing. Fig. 12 shows the lace-winged fly. Fig. 13 its eggs. Fig. 14 the larva. One will also find large numbers of the familiar lady-bugs or lady-birds upon corn. They are well known because of their hemispherical form, and their bright red or yellow color, dotted with round or lunate black spots. They lay their yellow, oval eggs among the plant-lice, which the larvæ greedily devour. The larvæ are elongated, often bright colored, and having many tubercles, and short spines projecting from the body. They attach themselves when they pass into the pupa state, the body shortens, the skin breaks, and is thrust off, or, in some cases, retained as a sort of protection. In the perfect beetle state they are as before described. Both in the larva and the perfect state they are inveterate enemies of plant-lice, and also bark-lice; and may be found almost any time feeding upon them or their eggs. Figs. 15, 16, and 17 show the perfect larva and pupa states of a lady-bird beetle.

Another natural check upon the too rapid increase of the plant-lice is found in the sweat-flies, or sweat-bees, as they are sometimes called. They are true dipterous (two-winged) insects, and are more gaily colored than our common flies. They are generally blackish, marked or banded with yellw. They have the habit of poising themselves in the air like the humming-bird, and are often seen in this position about flowers. They lay an egg among a mass of plant-lice. The egg produces a maggot which finds at once its appropriate food surrounding it. Reaching out like a worm, it pierces the body of a plant-louse, sucks it dry, and then seeks for another. It is capable of destroying a large number in a short time. When ready to go into the pupa state, it fixes itself to a leaf as a support, its body changes shape, becoming shorter and broader, tapering abruptly to near the end, which appears as if drawn out to a blunt point made up of two parallel tubes with dark tips. Fig. 18 represents such a pupa found among a group of plant-lice, or rather where such a group had been, because there were but few left, the greater number having been devoured by this larva which was now undergoing its transformation as a pupa. Fig. 19 represents the larva eating a louse, and Fig. 20 is the adult fly somewhat enlarged. Then there are also the internal parasites with which even such small insects as plant-lice are infested. In looking at a group of these louse pests feeding upon the leaves of corn, one may often see some individuals of a light drab color, dead or very nearly so, but holding on by their inserted beaks and legs. Some may be seen entirely dead, and with a large circular opening through the abdomen, within which is to be seen only a hollowed, dry interior. These are the lice that have supported parasites, and hence are so remarkably changed. These parasites are very numerous as to kinds, and are known under the general name of ichneumon flies. They are the most uncompromising foes of all soft-bodied insects, and one of the most valuable aids to the farmer in the check which they impose upon the undue increase of noxious species. A female ichneumon fly lighting among a group of plant-lice will, by a quick movement of her abdomen, in which is placed the ovipoisting apparatus, thrust an egg into each louse until her stock is exhausted. These eggs soon hatch, and the young larvæ begin at once to feed upon the soft, digestible matter of their hosts. In time the lice become so enfeebled by this process that they change color and die. Death is as inevitably the result as if they had been attached by the lady-bird or any of the insects before mentioned. Minute as are these ichneumon flies, and quietly as they perform their work, they no doubt do us most valuable service by this strange habit of providing for the wants of their young. The proof can readily be seen by noticing how abundant these drab or clay-colored individuals are upon any of the plants which are attacked by plant-lice. Fig. 21 shows a group of them found upon a blade of corn. It would seem as though these natural enemies of the corn-plant-louse would keep it in subjection, and we may hope that such will be the case. We should not be surprised, however, if it becomes so numerous as to call for artificial remedies. At present I know of none which are practicable on a large scale.

Other insects have been described as injurious to the young ear and tassel of corn. While they have done considerable injury at certain times and certain places, they have so far acquired only a local reputation. Doubtless we shall hear more of them from time to time, as they become more numerous and wide-spread. Still others have been confined to certain sections of country, outside of which they have no desire or ability to go. The most injurious insect of the country west of the Mississippi, namely, the Rocky Mountain locust, is unknown with us, and the chinch bug, which has at times totally destroyed the wheat and corn in many parts of the west, has never yet been a common insect with us.

Annoying as is the loss of our corn crop from the ravages of the insects which I have endeavored to describe, we in Pennsylvania suffer less than do the residents of many other States, and if we heed the teachings of experience, we can render our corn-fields reasonably safe and secure. We have nothing to compare with the Rocky Mountain locust, which in a single day destroys the entire dependence of an Iowa farmer, and whose coming and going are well nigh impossible to control. Our insects, though sometimes hard to reach, are not so universally destructive, nor so constant and persistent in their attacks. Constant vigilance, with judicious labor before they gain a firm foothold, will do much to overcome many of them. Using more seed, and thus making allowance for the destruction by insects is often practicable. A little labor will be needed to thin out the superfluous stalks, if the insects do not appear to do it, but this will ordinarily repay the cost by the fodder which is obtained at a time when extra feed is necessary for stock.

Some knowledge of insects, their transformations, and manner of life, such as this paper is designed to present, will, it is hoped, enable the intelligent cultivator to distinguish the injurious from the beneficial species, and, while waging an uncompromising war against the former, show him the advantage and necessity of protecting the latter by every means in his power. Let any one notice the number of "parasitised" individuals that may be found among a brood of caterpillars or plant-lice, and he cannot fail to appreciate the value of those insects which have this strange habit of providing for their young. Or, let one note the numbers of lady-birds that are always present where plant and bark-lice are so common, and he must admit that in them we have most faithful allies and friends. We need, too, to remember that our insectiverous birds are worth our careful protection, for they feed largely upon these very insects which we are devising means to destroy. Despite our laws upon the subject, we find this point litte thought of and considered. For a few moments' sport, scores of our smaller birds, whose insect-destroying power is very great, are recklessly shot and left to rot upon the ground.

When a more healthy public sentiment prevails, we shall hope to see these laws better observed, and our crops thereby benefited.

REPORT OF THE VETERINARY SURGEON.

To the Secretary Pennsylvania Board of Agriculture:

Pursuant with advices from you, I visited Westmoreland county in September, 1879, to ascertain the nature, causes, and if possible, suggest treatment for an enzoötic disease then causing the death of a number of cattle in that county.

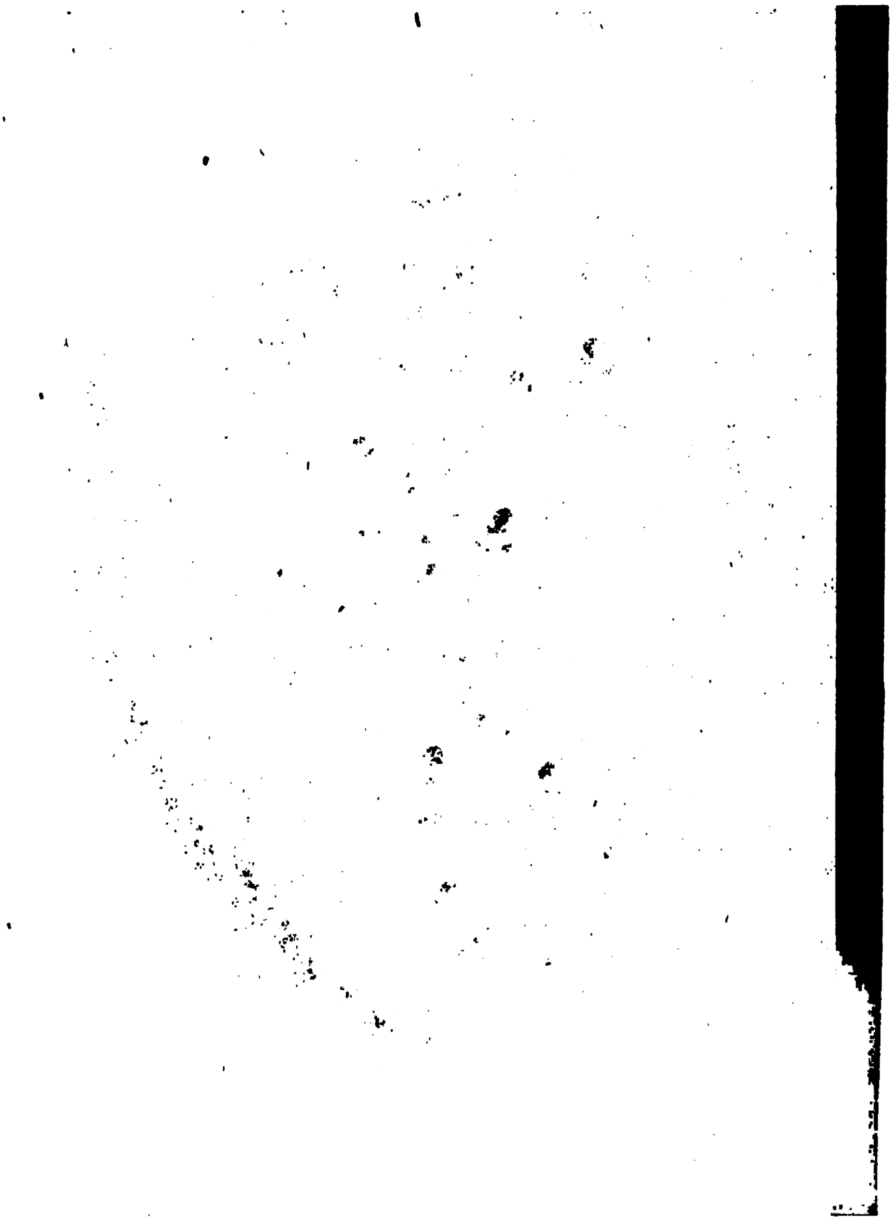
I have the honor to report, that on Monday, September 1, in company with F. Y. Clopper, of Greensburg, I visited the farms of Paul Good, senior, and Jacob Kemerer, near Harrison City, and elicited the following facts and history of this disease.

George P. and Paul Good, junior, who are engaged in butchering, have been dealing to a limited extent in Texan steers, which they buy at East Liberty stock-yards, and bring to their father's farm, where they are killed, to supply the neighborhood with beef. On 28th of May, 1879, twenty head of these cattle were placed with Paul Good, senior's, native stock, and butchered off as needed, without giving rise to any disease among his home stock.

On 23d of July, another lot of twenty-two Texan or Cherokee cattle were driven from the East Liberty yards, and placed with the cattle of Mr. Good. About two weeks after the introduction of this last lot, a cow belonging to P. Good, senior, sickened, and died. Within ten days, eight others of his herd also died. His nine other cattle either escaped the disease, or had it in such a mild form as to recover. At the time of my visit to this farm, there were nine of these Texans remaining.

George P. Good, who had a cow running with his father's stock, lost her also. In endevoring to get one of these Texans in the "close-pen" to slaughter, it became wild, and jumped over among Jacob Kemerer's cattle, where it remained for a short time.

About the middle of August, his cattle began dying, and he soon lost nine of his herd of twenty. John Holtzer lost a bull that had come in con-



Section of [illegible] lung ([illegible] interlobular cellular or connective tissue of a bright rose [illegible]

Average weight of either right or left lung, 3¼ pounds.

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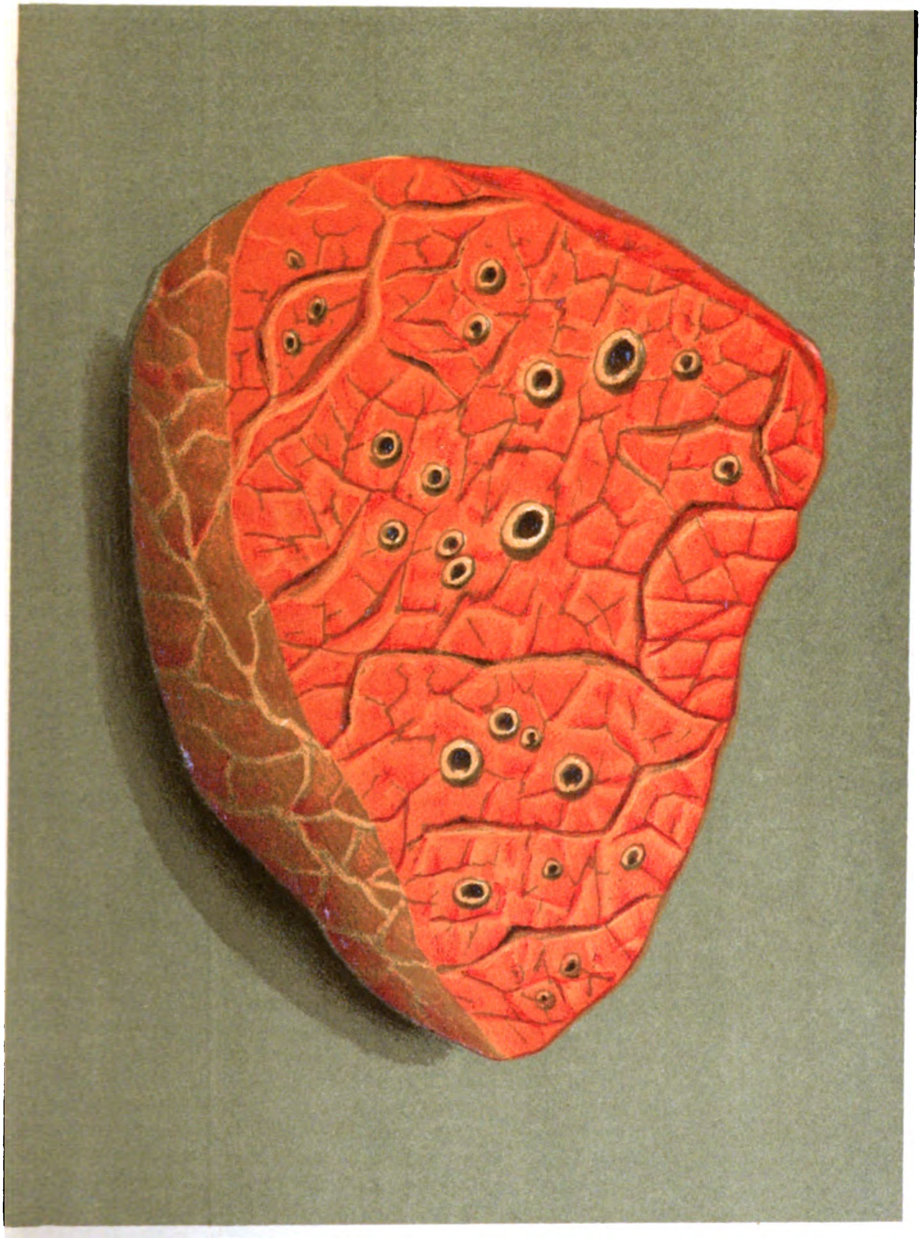

Section of healthy lung (Cow), showing the abundance of interlobular cellular or connective tissue of a bright rose color. Average weight of either right or left lung, 3½ pounds.

tact with the Texans. Widow Conkle lost her cow, it having grazed along the road over which these steers had passed. Two cases under the same circumstances were reported as occurring at Irwin. There were no cases of the disease to be seen, except two or three young animals at Paul Good, senior's, which were evidently convalescing. The Texans were at this time placed in a field entirely by themselves.

The symptons reported me of the cattle which had died, (dryness of coat; stiffness of gait; constipation, with faeces mixed with blood; discharge of mucous from eyes and nose; bloody urine; a dull, dejected, or stupid appearance of the animal, &c.,) the post-mortem lesions, these, taken in connection with the fact of the disease spreading only to those animals which had pastured with, or eaten along the trail of, the Texans, made it evident that the disease was that known as Texan or Spanish fever. The remaining Texans were directed to be slaughtered and sold at once; the entire place occupied by these cattle to be thoroughly disinfected, and the pastures to be vacated until next spring. Also advised that if any such animals are again brought into the county, that they be kept *entirely* away from all other cattle, and their excretions, hides, &c., be properly disinfected. Cattle should not be allowed to graze on lands occupied by Texans, nor on the roadside over which these animals have past, for at least two months.

This investigation, like all preceding ones, goes to prove that splenic-fever is only spread from gulf-coast cattle, and *not* from one native to another. Gamgee says: So far as recorded observation and my own inquiries at present extend, the animals contaminated by feeding on Texan trails have not in a single instance propagated the disease to other animals. Indeed, I have not met with a single instance where sucking calves have caught the affection from their dams, or from other cows which they have been made to suck. Many cases have come under my observation of cattle in Illinois, Indiana, and elsewhere, coming in contact with Texan cattle through a fence, by drinking of the same water, and even being housed in sheds with sick natives, and yet escaping the disease.

In view of the increased frequency of late years of outbreak of this disease, it may be well to lay again before the public a statement of the mode of origin and spread of this malady, with the necessary means to prevent these attacks.

Texas or splenic fever has existed ever since cattle of the Gulf States have come in contact with herds of northern and higher countries. There can be but little doubt that if the Indians ever drove the cattle which were native to the States bordering on the Gulf of Mexico, or cattle which had become acclimated to those States, northward to higher latitudes, even before the settlement of the States, that Texas fever must have followed in their wake wherever they came in contact with other cattle. The reports which came to us for a long time from Kansas and Missouri of the existence of this disease among cattle in those States failed to be noticed until, by the better facilities for transportation, numbers of Texan cattle were landed in Illinois, Indiana, and Ohio, where they infected vast numbers of native stock. A general fear now took the place of passive indifference, and the existence of Texas fever became a fact—a *startling* fact—to the owners of the large herds which graze on the extensive prairies of the west, as well also as to eastern shippers and buyers. Dr. James Mease speaks of this disease, in 1814, as having "long been known," and hints that possibly the "long-leaf pine country is the seat of the infection." In 1866 splenic fever existed in southern Kentucky and Kansas and south-western Missouri, and by 1877 it was reported as having made its appearance in

Arkansas, parts of Tennessee, North Carolina, Illinois, and the hills of South Carolina and Georgia; and in all these outbreaks the passage through, or presence of Texas cattle was traceable as the direct source of the malady.

In 1868, in addition to the States already mentioned as infected, we find added to the list—Ohio, New York, New Jersey, Pennsylvania, Virginia, and some parts of New England. "The investigation of 1868," as it is called, by Prof. Gamgee, gives the minute history of these specific outbreaks, which, to follow in detail here, would consume too much time and weary your patience. Suffice it then to say, that of late years the disease is constantly introduced into different sections of the country. There were some cattle that died with splenic fever near Pineville, Bucks county, during the fall of 1877.

ETIOLOGY.—We must look for the causes of this disease in the climate, soil, and vegetation of the gulf district. From the amount of evidence before us we conclude that these southern cattle become impregnated with a special poison, which prevails in these low latitudes, and the cattle which are born there, or introduced during the coldest weather, tolerate and retain their poison in their systems in a latent form, and only communicate it to cattle of a higher latitude, or different climatic conditions.

Native cattle, or those which have become acclimated to the gulf region, not only appear healthy, but on driving them north actually increase in weight, while all along their track they are leaving in their excretions this specific poison, which infects and develops splenic fever among cattle with which they are driven, or that pasture in the trail of the Texans within a month after their passage.

The singularity of this disease is, that while the gulf coast cattle are, to all *outward* appearances, healthy, they constantly eliminate a poison which attacks with fearful mortality cattle of a higher latitude. Texan steers which have remained north long enough to become acclimated (and this requires from two and a half to three months, after which they do not spread the contagion to other cattle) are, like northern cattle, subject to this infection; either by coming in contact with a fresh drove from the south, or by being driven into their former home.

If we come to hold autopsies of these *apparently* healthy Texas cattle we invariably find the spleen to be enlarged, and a number of erosions in the fourth stomach; while it is not uncommon to note fatty degeneration of the liver, and more or less bloody extravasation in the kidneys and bladder. Now and then of these native steers may be seen to be dull and droopy, and to void bloody urine, but they rarely die from the effects of this disease alone. The essential cause of this disease then appears to be a *special* poison, generated in the Gulf States, which, while it is tolerated by native cattle, becomes highly infectious and fatal when brought into contact with cattle of the northern and western States. Northern and western cattle do not, however, communicate the disease to any others, so that, although our native cattle may be dying by scores, from the passage of a drove, or single Texan steer, we can with perfect safety allow the sick and healthy to intermingle. Most, if not all, cases of Texas fever which we witness every summer in our eastern States contract the disease either in the stock-yards of the West, or from being shipped in cars or trucks which have been occupied by cattle from the South. The excrements are the medium of contagion to a very great extent, if indeed they are not the sole source; therefore, all cars which have been used for the transportation of cattle should be cleansed and disinfected before being again used. Gulf coast cattle should *never* be yarded with those of higher latitudes at the different stock-yards.

Splenic fever subsides after a few nipping frosts, and is not known to occur during the cold of winter. This establishes the fact that the *season* exerts a marked influence on this disease, prevailing during the late summer and fall, but never in the winter, and very seldom, if ever, earlier than June. From the fact that most of the cattle which died from Texas fever in this and adjoining counties in 1874, were covered with "ticks"—*Ixodes Bovis*—some authors jumped at the conclusion that death followed as a result of the constant drain and depleting effects of hundreds of these parasites preying upon the animals. It has been pretty thoroughly proven, however, that they have nothing whatever to do with the disease in question; nor are they at all *constant* to this complaint, or *limited* to it, being found on healthy cattle, and stock which have never come in contact with gulf-coast cattle.

NATURE.—Texan of splenic fever is an *enzoötic* whose special poison is generated only in certain localities, and only capable of transmission though the medium of the excretions, and that during the warm months. It is indigenous to Texas, Florida, and certain other parts of the gulf coast States below the thirty-fourth degree of north latitude. Although some able authorities have classed this as an anthrax disease, I am forced to take exception to this view, for the following reasons:

1. Cattle do not die in large numbers in the locality where the disease is spontaneous, as they do from anthrax diseases.
2. There can be no *inoculable virus* detected in cases of Texas fever.
3. Anthrax shows a decided preference for the *best* and *fattest* cattle of the herd, which splenic fever does not.
4. The flesh of anthrax cattle eaten by man develops malignant pustule; but this never arises from eating cattle which have been slaughtered while affected with Texas fever. Splenic fever is characterized by the absence of bacteria. Nor is splenic fever analogous to malignant typhus or typhoid fever. Its origin, development, and progress are essentially different. We do not see its counterpart in any of the diseases which affect the human family, although it is developed in the same countries where malarial diseases attack man.

An able investigator says: The conclusions, therefore, which I am disposed to draw from all the facts and arguments adduced in relation to the causes and nature of splenic fever, are:

1. That southern cattle, especially from the Gulf coast, are affected with a latent or apparent form of the disease.
2. That they become affected in consequence of the nature of the soil and vegetation on which they are fed, and the water which they drink.
3. That their systems are charged with poisonous principles, which accumulate in bodies of acclimatized animals that enjoy an immunity.
4. That southern cattle may be driven so as to improve in condition; and, yet, for some weeks, and, probably, not less than three months, continue to excrete the deleterious principles which poison the cattle of the States, through which the herds are driven on their way north and west.
5. That all breeds of cattle in States north of those on the Gulf cost, without regard to age or sex, if they feed on grass contaminated by southern droves, are attacked by the splenic fever; that the disease may be, but is very rarely, propagated through the feeding of hay.
6. That the disease occurs mainly during the hot months of summer and autumn, and never after the wild grasses have been killed by frosts, until the mild weather in spring returns; that then the grasses are healthy, and continue healthy, unless fresh droves of Texan or of Florida cattle are driven over the land.

7. That the heat and drought [illegible]

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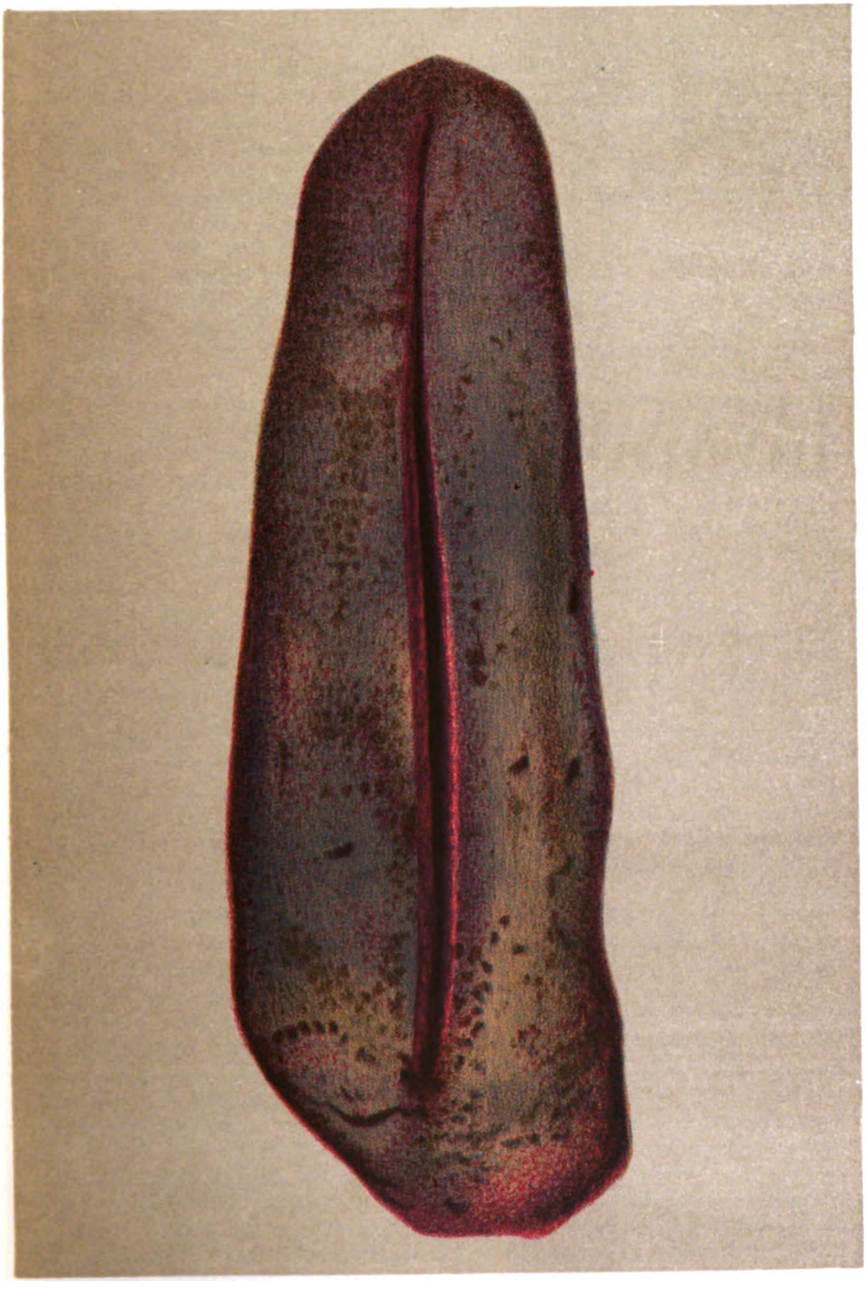


THE SPLEEN — INCISED — IN SPLENIC FEVER.

7. That the heat and drought aggravate the disease in individual animals.

8. That there is not the slightest foundation for the view that the ticks disseminate the disease.

9. That the splenic fever does not belong to that vast and deadly group of purely infectious and contagious diseases of which the rinderpest, the lung plagúe, and eruptive fevers, are typical.

10. That it is an enzoötic, due to local influènces, capable of only a limited spread, and analogous to or identical with the "black water" of various parts of Europe.

11. That, however warm the weather may be, cattle affected with splenic fever have not developed in their systems any poison like the anthrax poison; and that the flesh, blood, and other tissues of animals are incapable of inducing any disease in man or animals.

12. That splenic fever is not malignant typhus or typhoid fever. That it has no analogue among human diseases, but is, however, developed under conditions which prevail where the so-called malaria injuriously affects the human health.

SYMPTOMS.—Texas fever passes through four stages, viz: The *Incubative*, *Invasive*, *Congestive*, and *Terminative*.

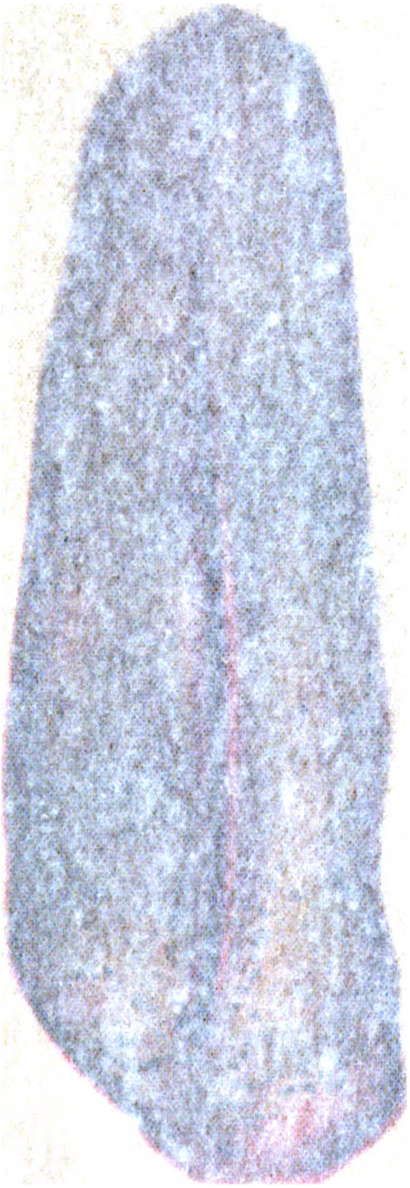
First, or *Incubative Stage.*—The precise length of the stage is uncertain; but by the best authorities it is estimated to cover a period of two to four weeks. During this stage, the abnormal signs are not appreciable to the casual observer, nor are they, in fact, to the veterinarian, unless he note accurately the *temperature* of the body.

An increase af animal heat *alone* would not be sufficient to say that Texas fever existed, but would only indicate that some febrile disorder was about to make its appearance. Other circumstances would have to be taken in connection with this rise of temperature to diagnosticate this *particular* fever.

Second. The Invasive stage varies in duration from four to seven days, and here also the principal symptom is a marked elevation of temperature, accompanied by more or less dullness. The thermometer during this stage, registers from one hundred and two to one hundred and eight degrees Fahrenheit.

Third. The Congestive stage.—This lasts from two to four, and sometimes six days. The animal is dull, movements slow, and functions of body not active. Head droops, ears lop, stand apart from other cattle with arched back, and legs well under the body. A disposition to lie down is soon noticed. The bowels have, as a rule, a slight tendency to constipation, and the fæces are covered with small clots of blood. The urine is high colored or *mixed with blood.* Skin is dry and harsh to the touch. There is a slight discharge of mucus from the nose and eyes. The pulse, which at first was full and hard, becomes rapid, feeble, and easily compressed. The head is frequently thrown out flat on the ground, or turned back on the side. The temperature during this stage gradually increases. The breathing is hurried and labored. There is evident weakness of the hind extremities, sometimes amounting to inability to rise. Nervous twitchings of the muscles are not uncommon. I saw one case in which it required considerable effort to keep one of the hind limbs quiet. It was continually flexed and extended if not maintained in a fixed position. These animals are sometimes in a comatose condition.

Fourth. Termination.—In nine cases out of ten, the above symptoms increase in severity, diarrhœa sets in. The temperature falls to one hundred or ninety-eight degrees. Stupor supervenes, and death ensues almost imperceptibly. Occasionally the frebrile symptoms subside, the fæces as-



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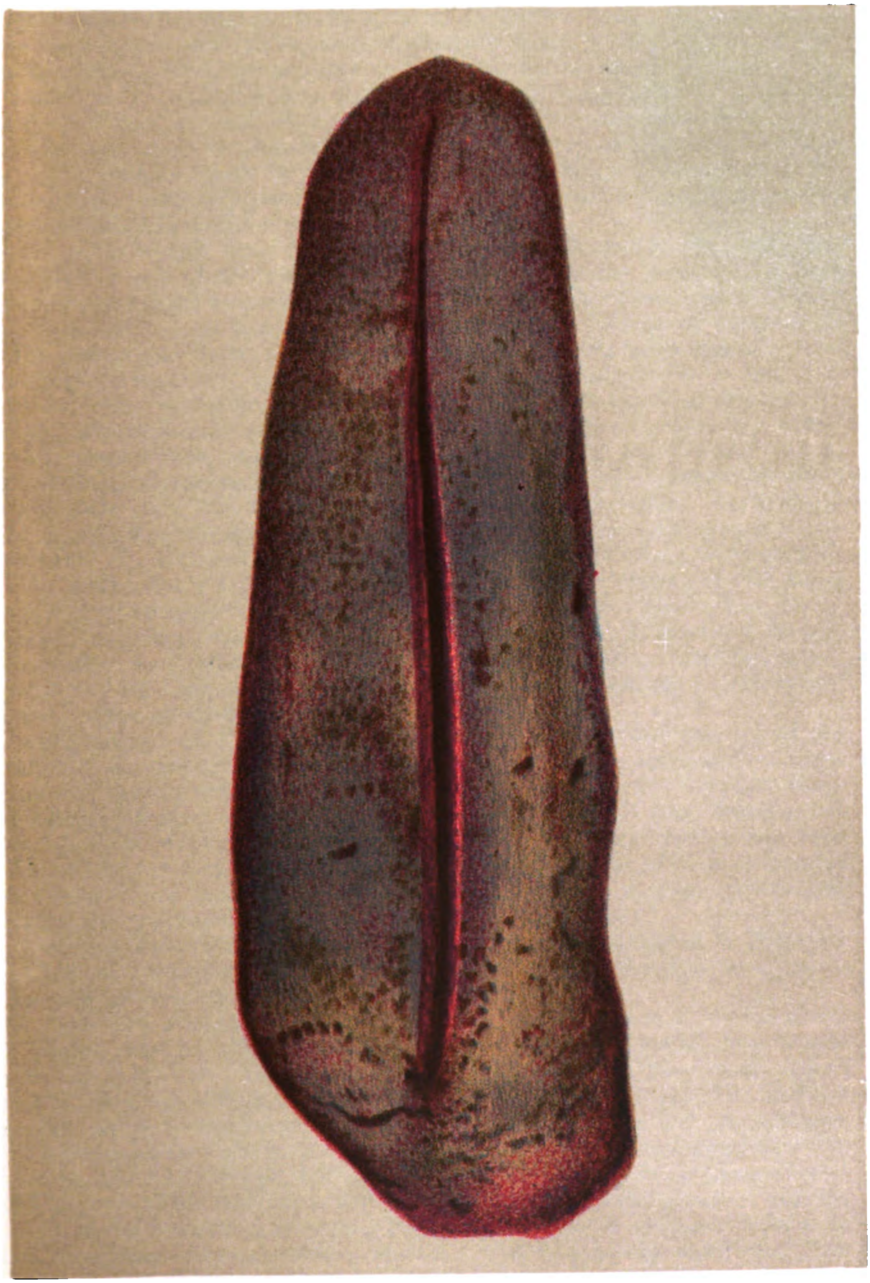

THE SPLEEN—INCISED—IN SPLENIC FEVER.

sume a more natural aspect, the urine becomes paler, gait is steadier, appetite returns, and convalescence takes place. But even then two months elapse before the animal shows signs of laying on flesh. In these cases, however, gastro enteritic sequelæ often occur which prove fatal.

PROGNOSIS.—Unfavorable, especially during the warmest weather.

MORTALITY.—Taking into consideration the complications which are likely to follow, at least ninety-five per cent. of the cases prove fatal.

POST MORTEM APPEARANCES.—In native Gulf coast cattle, which were apparently healthy, there is found an almost constant enlargement of the spleen, and petechial spots visible in the fourth stomach and intestines. The urine is found sometimes to be bloody.

In cattle which have died from the disease, we notice that they are slightly, or not at all, tympanitic, *rigor mortis* is not well-marked, and bloody discharges are seen at the nose and anus. The flesh is more yellow in color, easily torn, and has a disagreeable order. The blood shows well-marked lesions. It is *fluid*, though thickened in the large vessels; it is nowhere coagulated, and in the small veins and arteries it is thin and watery. The hematine, or coloring principle of the blood, is partially or wholly disorganized; so much so that after some post-mortems my hands and arms have not been discolored by the blood. Of the internal organs, the abomasum, spleen, and liver are principally affected. Erosins and ulcerations have been found from the fourth stomach to the anus. Ecchymosis and small petechial spots are seen on the heart, pleura, peritoneum, in the pelvis of the kidneys, and in the bladder. The last organ is frequently found distended with bloody urine. The liver is seen engorged with blood and fatty degeneration is a frequent accompaniment. The spleen is enlarged, weighing from two to eight or nine pounds. It is of a dark purplish color, and, when cut into the pulp, oozes out. The trabeculæ, which are so plainly noticeable in healthy spleens, are completely broken down, and no trace of them can be found.

TREATMENT.—A CURATIVE.—Texas fever may be set down as one of the incurable diseases. Although a few cases recover, we are unable to state whether they recover in *consequence* or in *spite* of the remedies used. Bleeding, purging, and stimulating treatments have all been resorted to, but of little or no avail. Almost the entire materia medica has been searched in hope of finding a specific, but we are as far from it now as we were when the malady first made its appearance. Beyond the proper hygienic requirements, little good can be accomplished.

PREVENTIVE.—The preventive treatment which was adopted in Missouri, in 1868, is indicated by the following letter, which appeared in the *Prairie Farmer* for September of that year:

"Talk to a Missourian about moderation when a drove of Texas cattle is coming, and he will call you a fool, while he coolly loads his gun, and joins his neighbors; and they intend no scarce either. They mean to kill, do kill, and will keep killing until the drove takes the back track; and the drovers must be careful not to get between their cattle and the citizens, either, unless they are bullet-proof. No doubt this looks a good deal like border ruffianism to you, but it is the way we keep clear of Texas fever, and, my word for it, Illinois will have to do the same thing yet. Congress ought to do something in regard to this stock. Very stringent laws were passed in regard to the rinderpest, and yet it is scarcely more fatal than Texan fever, only the latter is not contagious among our native cattle. Texas cattle should not be allowed to cross the thirty-fifth parallel of north latitude alive."

If a few Missouri farmers, or farmers from any State, controlled our Legislatures, their interests would be better protected, and *no class of men* need protective laws as much as the agriculturist. What we mainly want in connection with Texas fever is some suggestions, which, if acted upon by the Legislature, will insure the stock owners of the North and West an immunity against the heavy losses which they have sustained from this enzootic.

Texas or splenic fever is indigenous only to the Gulf coast States, and hence our entire attention needs be turned to the disposition made of these Southern cattle. It will take a very long time before sufficient attention to sanitary laws will be observed in Texas, Florida, and other parts of the Gulf States, where Texas fever exists as an enzootic, to effectually prevent its development.

Of course, to at once prohibit, in toto, all trade in southern cattle would *positively* put an end to Texas fever, but this is impracticable. The cost at which cattle can be raised in Texas is so low that they can be sold at much lower rates than our northern stock, and so long as this is so, there will be a demand for them which must be supplied. Could these animals be killed in their native place, and be shipped then to our great centers, the difficulty would likewise be met. Whatever measures we adopt, it is evident that complete isolation must be secured. The transportation of Texans, on foot, should be limited to the winter months, when the home stock is confined to small areas and is not in danger of coming in contact with the droves. During the spring, summer, and fall months *all* Gulf-coast cattle should be transported by steamboat or rail; that whenever and wherever landed, there should be yards, fenced in, where these cattle can be kept exclusively; that all cars or boats used for such transportation should be thoroughly cleansed and disinfected, the neglect of which should be an offense punishable with a heavy fine and imprisonment. When we have to deal with a disease like this, which is not transmissible if only a fence separate the cattle, the preventive means seem simple and easy to adopt—*i. e.*, let no cattle commingle, either in pastures, roadways, or unclean trucks, with southern stock.

Through the medium of transportation, we of the eastern States are afflicted with splenic fever, to prevent which it is only necessary to allow no gulf-coast cattle to mingle with others at the different stock-yards, and to thoroughly disinfect the boats, cars, and trucks on which they are shipped.

To prevent Texas fever, then, it is only necessary to avoid *immediate contact* with Gulf-coast cattle or their excreta.

MINERALOGY AS RELATED TO FARMING.

BY FREDERICK PRIME, JR., *Assistant State Geologist of Pennsylvania.*

The soil forms the latest and topmost bed of the earth's crust, and differs from the older geological beds in that its formation is still going on. Soil is formed by the decomposition of rocks, this being hastened and aided by the action of heat, moisture, and air. Rocks again are composed of minerals; hence, it is evident, how important a certain knowledge of mineralogy is to the farmer, in order that he may know of what soils are composed.

The minerals most commonly occurring on the surface of our globe are:

1. Quartz, composed of silica.
2. Feldspars, composed of silica and alumina, together with either potash, soda, or lime, (sometimes all three together.)
3. Micas, (commonly called isinglass,) composed of silica and alumina, with either potash, magnesia, or oxide of iron.
4. Hornblende, composed of silica, magnesia, oxide of iron, and lime.
5. Pyroxene, having the same composition as hornblende.
6. Talc, composed of silica, magnesia, and water.
7. Serpentine, having the same composition as talc.
8. Chlorite, composed of alumina and oxide of iron, in addition to silica, magnesia, and water.
9. Calc. spar, composed of carbonate of lime.
10. Dolomite, composed of the carbonates of lime and magnesia.
11. Gypsum, composed of sulphate of lime.

All the principal rocks met with in nature are formed by these minerals, either alone or in different combintions. Thus granite and gneiss are composed of quartz, mica, and feldspar; the mica being partially or totally replaced by pyroxene or hornblende.

The greenstones, basalt, and syenite, are composed of feldspars and hornblende or pyroxene.

The felsites and porphyries contain feldspar alone, or this mixed with quartz.

The trachytes and phonolites contain feldspar, hornblende, and mica.

The mica slates and mica schists are composed of mica and quartz, with more or less feldspar.

The chlorite and talc schists of chlorite, or talc and quartz.

The limestones of either pure calc. spar or dolomite.

The sandstones and quartzites consist for the most part of quartz.

While the ordinary slates and shales are usually composed of silicates of alumina, with greater or less quantities of lime, magnesia, oxide of iron, and water.

Returning now to the minerals composing these rocks, it is important to consider the ease or difficulty with which they decompose when exposed to the action of natural agents.

Quartz entirely resists the ordinary agents to which it is exposed; being only broken up by changes of temperature, ice, or running water into powder. If rocks, of which it is an ingredient, are decomposed it remains as gravel or sand, intermingled with the clayey mass into which the other minerals are converted.

Feldspars differ much as to the readiness with which they are decomposed, this being dependent on their composition. Those in which lime forms the chief base decompose most easily, next those containing soda, and least of all the potash feldspar. If subjected to the action of water containing carbonic acid in a free state, this will remove the potash, soda, lime, and a part of the silica. So that finally there will remain only silicate of alumina, or a mixture of this with carbonate of lime, and small quantities of the silicates of soda and potash. The products of decomposition are called kaolin, clay, loam, and marl.

The readiness with which pyroxene and hornblonde decompose depends upon the greater or less amount of lime and protoxide of iron which is present; the former hastening, the latter retarding, the operation. As they contain much less alumina than the feldspars they do not form any clay, (in its proper signification), but rather ocher, fuller's earth, or loam. In the products of decomposition we find large quantities of iron-salts, carbonate of lime, dolomite, and silicate of magnesia.

The micas usually decompose with great difficulty. Naturally their chemical composition exerts an important influence on the rate of decomposition, it happening that the less soda they contain the more do they resist decomposition.

Talc and serpentine practically undergo little or no decomposition.

Calc. spar and dolomite are always more or less dissolved by the water (when it contains a little free carbonic acid) which comes in contact with them, besides breaking up into small fragments and sand.

Gypsum is readily dissolved by water, and on this account rarely leaves any permanent products of decomposoitin.

As regards the decomposition of the rocks, the following facts have been observed:

Granite gives rise to gravel, pieces of feldspar, quartz grains, and plates of mica, intermingled with greater or less quantities of clay.

Syenite yields an ocher—brown to light yellow clay, which readily falls to powder when dry—together with occasional fragments of hornblende, epidote, and chlorite.

Gneiss decomposes to an ocher—yellow, to reddish brown clay—containing grains of quartz, pieces of undecomposed rock, fragments of feldspar, and plates of mica. Varieties of this rock, richer in mica and poorer in feldspar, form a lean plastic clay, which bursts on first drying, and then forms foliated masses, commonly of a brown color, and full of innumerable plates of mica.

The decomposition of the porphyries depends, on their composition, texture, amount and kind of feldspar they contain, and degree to which they are fractured. They usually decompose to an impure crumbling dark brown clay containing grains of quartz, fragments of felsitic material and kaolinising feldspar crystals; the clay often contains two to six p. c. of carbonate of lime, when the porphyry contained a lime-oligoclase.

The trachytes yield a pale greyish-yellow to whitish clay, very near kaolin in composition.

The phonolites yield an impure white or light gray crumbling marl, which, on drying, forms a crumbling mass, this gradually hardens in dry air, and becomes very solid. In moist localities this marl tends to form a swampy bottom, but in dry and shady localities makes a very productive soil, containing two to five per cent. of carbonate of lime, and five to ten per cent. of soda salts.

The mica schists decompose, if the existing mica is a potash-mica, to an ocher-yellow loan containing a little quartz sand, ocher and undecomposed mica. In the presence of magnesia-mica it contains quartz sand and plates of chlorite, talc, or pieces of soapstone, together with considerable oxide of iron.

The chlorite schist decomposes to a lean greenish-gray or ocher-yellow clay, containing a little quartz sand, ocher, silicates of magnesia and often contains undecomposed chlorite or soapstone.

The greenstones and basalts yield products of decomposition closely resembling those of syenite.

An examination of the mineral ingredients of a soil shows that these can be divided into three groups. First, those which form the chief ingredients of the soil, giving it a certain mineral character and imparting to it certain peculiar physical characteristics. They are insoluble in pure water, but are more or less easily dissolved by water containing free carbonic acid. Examples are clay, quartz sand, dolomite, and gypsum. Second, those ingredients which may be absent from a soil without changing its mineral character, although when present they exert more or less influence in modifying the physical character and fertility of the soil in question. Examples are erratic blocks, rocks, pebbles, and sand. Third, such ingredients as are soluble in the water present in the soil, promoting the decomposition of the stony materials of the soil, and which are, with few exceptions, the proper feeders of the plants. In a few cases these ingredients may modify ephemerally or premanently the character of the soil.

While clay, sand, and lime form always the essential ingredients of a soil, its chemical and physical properties will be essentially modified by the unessential ingredients which are present.

Following Senft, we can, therefore, classify the soils into—

I. Sandy soils.
II. Clayey soils.—1. Free from lime; 2. Containing lime.
III. Loamy soils.
IV. Calcareous soils.—1. Marly soils; 2. Lime-clay soils.

I. The sandy soils are granular mixtures, almost in the condition of a powder, which, on washing, will not contain more than twenty per cent. of clay, and at least eighty per cent. of various minerals other than carbonate of lime. Often it contains as much at sixty per cent. of pure quartz sand. Pure sand is sterile, but by the admixture of very small quantities of clay, lime, and humus, it becomes fertile when favorably located and well cultivated. A sandy soil allows the rain-water to filter through it very rapidly, consequently it soon dries up and requires a wet or impervious sub-soil. It possesses a higher power of radiating heat than any of the soils, and hence the greatest bedewing power when in a free and open location. But this very power of absorbing heat readily during the day and cooling off at night, causes the plants raised on such a soil to freeze easily in the early spring. On the other hand, this very property causes such a soil to thaw earlier in the year, and hence permits of an earlier cultivation. A sandy soil is characterized by its looseness, and can always be easily worked; but care is necessary not to render it too porous. It requires frequent and abundant manuring, since the manure rapidly decomposes in such a soil. When sufficiently manured and favorably located, it yields excellent crops. Manures rich in organic matter improve it greatly. In moist years, the crops raised on such a soil ripen early, but in dry seasons they often parch up. Oats, barley, rye, buckwheat, millet, beans, and potatoes, as well as wheat and turnips, grow well on it, if the fields are as carefully cultivated as in Belgium and Holland, where the sandy soils are most carefully watered and manured, thus converting miles of sandy wastes into most luxuriant meadows.

II. The clayey soils are mixtures of at least sixty per cent. of clay, and at the most forty per cent. of sand, together with two to seven per cent. of silica, soluble in alkalies, and four to five per cent of oxide of iron, as well as greater or less quantities of loose stone. They are coherent, when moist, more or less flexible and pasty; when dry, more or less solid and full of cracks. As before stated, these soils may be divided into those free from lime and those containing it.

1. CLAYEY SOILS FREE FROM LIME.—When wet, these soils are usually unproductive, but by a proper system of drainage their character can be greatly improved, and they are then well adapted to raising grass and for pasturage.

2. CLAYEY SOILS CONTAINING LIME.—Such a soil warms through, but only slowly, remains wet a long time, requires a dry climate and a dry porous

sub-soil. Wet seasons and a northern exposure are unfavorable to its productiveness, and it can then only be worked with difficulty, and must be plowed when not too wet. This soil has a high power of absorbing ingredients which nourish plant-life, while, on account of its stiffness, it restrains plants from putting out great masses of roots. When exposed to much rain, its surface is easily closed, by which means evaporation is greatly hindered; thus exposing the roots of cereals and seed potatoes to rot. On the other hand, when rapidly dried by a high temperature, roots, especially of cereals, are apt to be exposed and torn by the cracks which form in the solid crust.

The best means of improving a heavy clay soil are draining, calcining, mixing with lime and sand, a thorough working of it with sub-soil plows, and mellowing by turning up and letting the frost act on it. It requires large quantities of manure, especially such as loosen its texture, *e. g.*, straw manure. Artificial manures are less advantageous. The crops which grow best on a clay limey soil are wheat, oats, barley, clover, beans, and rape; while rye, potatoes, and turnips do not flourish so well. This soil is not particularly adapted to fruit culture.

III. Loamy soils are uniform mixtures of crumbling loam, containing thirty-five to sixty per cent. of coaser and finer sand, and often several per cent. of carbonate of lime. Such soils are the most fertile of all.

The sandy varieties dry easily and fall to powder, consequently they should not be turned up to any depth, and care must be taken not to loosen the soils too much. The limey or calcareous varieties contain greater or less quantities of limestone fragments. The loamy varieties contain four to ten per cent. of carbonate of lime, intimately and uniformly intermingled through them, and commonly as high as twenty-five per cent. of sand, and it is rich in alkaline salts. These dry more rapidly than the calcareous sorts, and fall to a light powder; they general form a most capital soil.

IV. The calcareous soils are uniform or heterogeneous mixtures of at the most seventy-five per cent. of common clay, with at least fifteen per cent. of carbonate of lime. They generally also contain a few per cent. of fine to coarse quartz sand, oxide of iron, carbonate of magnesia, and small quantities of the phosphate and sulphate of lime. They are sub-divided into marly and lime-clay soils.

1. Marly soils form all manner of transitions, owing to the various subordinate ingredients they contain. The clay-marl soils require a long period of cultivation and manuring to convert them to a fertile state. And after being brought to such a condition, they must be enriched with manure of a long fiber, (like straw,) and with crops having abundant roots to keep them solid, and prevent their breaking up into powder. When favorably located, they require a moderately moist and warm climate.

The loamy-marl soils when in a sunny and airy situation, require frequent and large applications of manure, and have sometimes to be worked quite deep.

The sandy-marl soils are usually formed by the decomposition of sandstones, having a lean marl cementing medium. They are hot, quick drying, and therefore very loose and easily washed soils, which only yield good crops by repeated and thorough manuring, and when open to a moist exposure.

2. The lime-clay soils are heterogeneous mixtures of at least seventy per cent. of carbonate of lime, not more than thirty per cent. of clay, and usually two per cent. of carbonate of magnesia, often containing several per cent. of lime-sand, and rarely quartz-sand. They are usually light colored, absorb heat readily, and also retain it easily. When subjected to a moist

exposure, they decompose manure more rapidly than any of the soils, and consequently require more frequent and abundant manuring, while they also demand a great deal of moisture from their great capacity of absorbing heat.

In general, the value of the soils of this class are dependent on their situations and moisture, as well as their sub-soil. Where the latter is porous, they are sometimes so sterile, that even grass cannot grow. As a general rule, dryness is their great fault, especially on southern exposures. Almost all crops grow capitally on the better class of these soils, and they are also well adapted to raising fruits of all kinds.

In the foregoing pages, for which I am in great part indebted to Hoffman's Ackerbau-Chemie, it has been briefly attempted to show of what the soils are composed, and whence they are derived. This is the limit to which mineralogy as related to farming can go. But the intelligent farmer, after reading this, and finding out either by himself or by analysis, to which of the soils above mentioned those he farms belong, (and this he can often do by observing from what rocks they are derived,) will naturally have recourse to works on agricultural chemistry, to learn how the soils may be improved by artificial means, and what crops he can best raise.

*PAPERS READ AT THE ANNUAL MEETING.

THE PRODUCTION OF MILK.

By J. P. BARNES, *Member from Lehigh.*

In considering the subject of "The production of Milk," one of greater or lesser importance to all persons interested in agriculture, I feel that whatever can be said by me will fall far short of what could have been said by some other members of this Board, who have had years of practical experience in that direction. I do not purpose naming the breed of cattle it is necessary to have for the purpose of producing milk, either in quantity or quality. I am well aware that in the different localities the various breeds have a preference, which is generally governed by the nature of the soil, the purpose for which the milk is to be used, and the disposition to be made of the cows after their milking qualities shall have declined, and last, but not least, the preference of the owner. Therefore, it would not be advisable for me to impress upon you the necessity of either the Devon, Durham, Short-Horn, Holstein, Ayrshire, Alderney, Swiss, or any other breed that would satisfactorily meet your individual localities, needs, or opinions. Each breed has its place to fill. Cows differ almost as much in the quality and quantity of their milk as they do in their external form and appearance. There are good milch cows in all the various breeds, even amongst our native cows some excellent milkers are to be found. Therefore, whatever breed, or whatever variety in breeds, you may desire to possess, the first consideration is to have the best of their kind, as the best are always the most profitable. In making a selection of milch cows, it may be well to take into consideration some of the points that are accredited as indicators of good cows for milking purposes. In a good cow, the head should be fine in the muzzle, deep in the jaw, broad between the eyes and the jaws, and with large nostrils. The eyes should be rather large, mild, bright, and active, but not nervous and restless; the ears should be deep yellow inside; the horns should be fine and thin, yellowish in color at the points, and clear and waxy in the texture of the surface; the neck should be slender and tapering, with a capacious windpipe; the dewlap should not be prominent or fleshy, and the point should show a yellow color; the chest should be broad and roomy, but not deep; the back level, widening out across the hips, where it should be broad and flat; the body should be deep in the belly, gradually tapering from the shoulder backwards; the ribs should spring out well, and there should be ample space between the last rib and the hip; the shoulders and the thighs should be thin and narrow; the legs fine in bone, and not of great length; the hoofs should have a waxy surface; the pelvis should be broad, and the tail should be set pretty high above it, lying well down between the prominent bones, and should be thin and long, reaching near to the ground; the udder should be large, loose, and squarely formed—come well forward, and run well behind—with the teats placed well apart from each other; they should be long, and of such a size that they can be handled in milking with ease; the milk vein should be large, and run well forward; the skin of the whole body should be loose and of a yellow color.

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*We regret that the space assigned us will not permit of the introduction of the discussions among the practical farmers present during the reading of these essays.

The "escutcheon," known as "Guenon system," is a point that is much dwelt upon, by many, as an important milk indicator, which should have its due consideration. Therefore, to be brief, permit me to refer you to the facts as given by the committee appointed by our ex-Governor, former president of this Board, to investigate and test such system, as published in the quarterly reports of the State Board of Agriculture, for the months of June, July, and August, September, October, and November, 1878, and to such other authorities as you may desire to consult. I will even not exclude Mr. Reeder, who has just read an essay on the negative side. In generating stock for milking purposes, always secure a full blooded bull, masculine in appearance, but gentle, of whatever stock the choice may be, and never inbreed. Select only of the best milch cows, of such as have quiet dispositions; the calves to be raised for milking purposes. To realize good results from cows, they should be in good health and good condition. To promote and sustain health, they need necessary protection and shelter; for which purpose, in this State, we are well supplied with barns. However, they should be constructed so as to afford pure air for the cattle to breathe, with every facility for cleanliness, as far as possible, in the feeding department and in the stalls. The yard annexed should have a southern exposure, for the purpose of giving the cattle all the outdoor air and sunshine needful during the winter months, in fair weather. The animals should not be turned out in the cold and storms, to become damp and chilly; it is neither humane nor economical.

Their food should be of such kind and quantity as to benefit their health and condition. They should have such other additional attention and care as experience has taught us necessary for retaining their health and milk producing qualities. In feeding cattle, it must be taken into consideration that the system of the cow is a laboratory in which chemical and mechanical changes are constantly going on. Into this we put the raw materials, consisting of the articles of food, a part of which is required to support the animal, repairing the waste, to keep up the warmth; a part is thrown off as refuse, and a portion is yielded for the support and profit of the farmer. What is required is to give the cow just such quantity and quality of food as shall give in return the greatest production of milk, and prove the most profitable to the owner. If too large quantities of these substances, or any one of them, are given, digestion will be interfered with, and the yield of milk will be diminished; if too little, it will have the same result. The amount of food needed is just as much as can be digested, which must be regulated in accordance with the capacity of the different animals to maintain them in a good condition, and the largest quantity of milk the structure is capable of producing. Each cow has a limit, governed by her structure, and when that limit is reached, increased feeding cannot increase the product. The greatest result is reached when the food keeps her to this limit, and is not in excess. Superior cows will bear more feeding, to reach the limit of their production, than inferior ones. The superior cow is seldom fed beyond her limit, while the inferior cow may easily be fed beyond her limit. Their food for winter use should be of the best nutritious hay, which should be cut early, and nicely cured; ground food with the different kinds of fodder, cut or uncut. But, I have no doubt, the farmer who cuts the fodder, moistens it, and mixes therewith a portion of bran or meal, instead of feeding them separately, is well paid for his time and labor in doing so. The different kinds of roots are also valuable. A quart of bran, in a bucket full of luke-warm water, with a little salt thrown in, will aid the flow of milk very materially. It is very important to establish regularity in feeding, watering, and milking cows. Do not most of our farmers err in diminishing the quantity of food while the cow is dry? Does it not develope the milking powers of a cow to the best advantage if she be fed liberally while dry? There is a large demand on her system to sustain the growing calf, which should be supplied by food. The food should not be stimulating, but enough should be given to keep the animal in a good condition. A dollar's worth of food given before coming in, returns much more, actually, than the like expenditure afterwards. If the cow is poor when she comes in, food then given will not return a good result, for she will need it to supply the wants of the system.

In the feeding of milch cows, Mr. Hart, of Connecticut, says: "My own practice is to give a light feed the first thing in the morning, which will be eaten up in ten or fifteen minutes, while the milking is going on, and then the ground feed is given to dry with a small quantity of salt. In about an hour the cows are let go out to go to water, and I prefer they should go twenty or thirty rods to drink from warm springs, and get exercise, rather than drink almost frozen water in the yard. While they are absent the stables are cleaned, and another feed about the same as the first given, and the cows put up immediately on their return, which will be in about an hour, and they stand or lie down at their choice, in an atmosphere almost as genial as the family sitting-room. If I am feeding roots they are fed just before milking at night, and the last feed of the day is given immediately after, which is always the largest, and is dictated by what I observe when the animal is at pleasure, which is, that she always takes the largest meal just at night. A healthy cow giving milk in winter has a voracious appetite, and if allowed will eat far more than she can properly digest, and, therefore, much is waisted, unless the quantity is regulated by careful observation and experiment."

Litchfield says: "The most economical food for milch cows is a mixture of hay, meal, and bran, and the most economical way of feeding these is to cut the hay, moisten it, and sprinkle the meal and bran over it. This gives some trouble, but it pays. From our own practice we believe twenty-five per cent. of the feed is saved. One bushel basket of cut hay and two and a half quarts of corn meal and bran, mixed in equal proportions, is a feed for a cow in good milk. To some cows more of the meal and bran might be given profitably. This must be found by testing the different cows. The above feed is for half a day, that is given twice in a day, making five quarts of the meal and bran daily. In addition to the above feed a few pounds of dry hay, or some roots, may be given at noon."

Mr. Hart gives the result of his experiments in feeding for the production of milk for one year, as follows: "First dairy of twelve cows produced a total of thirty thousand six hundred and eighty quarts, being an average of twenty-five hundred and fifty-six quarts per cow. Second dairy of twenty-one cows, total, fifty-three thousand four hundred and forty-five; per cow, twenty-five hundred and forty-nine quarts. Third dairy of eighteen cows, forty-seven thousand one hundred quarts, average per cow, twenty-six hundred and fourteen quarts. Fourth dairy of twelve cows averaging, for three years, twenty-four hundred and sixteen quarts. This taken all through, gives an average per cow of twenty-five hundred and thirty-four quarts for one year; about two hundred and twelve quarts per cow for one month, and about seven quarts per day.

A remarkable Jersey cow owned by Harry Newton, of Southville, Massachusetts, with a record of milk yielded from April 17, 1876, to March, 1877, during which time she yielded ten thousand and seventy pounds of milk, as follows: From April 17 to the 30th, four hundred and seventeen pounds; May, thirteen hundred and sixty-five pounds; June, fourteen hundred and six pounds; July, twelve hundred and forty-seven pounds; August, eleven hundred and fifty-five pounds; September, nine hundred and ninety-two pounds; October, nine hundred and seventeen pounds; November, seven hundred and ninety-four pounds; December, seven hundred and eighty-eight pounds; January, 1877, seven hundred and sixty-seven pounds; February, five hundred and fifty-one pounds; March, three hundred and seventy-one pounds; total, ten thousand and seventy pounds. On April 15, 1877, she calved again. The butter produced within the year was four hundred and eighty-six pounds, besides which milk and cream were supplied for the family, which yield of milk is an average of about fourteen quarts per day.

W. W. R., of Pendleton Factory, of South Carolina, writes that his cow, a grade Ayrshire, was awarded the first premium for the best milker, at his county fair, where she gave thirteen and a half quarts of milk at one milking. The same cow also took the first premium for milch cows at the South Carolina State fair. He thinks this is a very good result for a cotton State; and so do I. The best yield for a herd is that of Col. H. C. Hoffman's Holstein herd, at Horseheads, New York, consisting of six thorough-breds and four half-breeds, which averaged eighty-seven hundred and forty pounds of milk per cow, for one year, making about three hundred and thirty-nine quarts per month, and eleven quarts per day. One cow of this herd yielded eleven thousand six hundred and eighty pounds of milk, which would be equivalent to about fifty-four hundred and thirty-two quarts in one year, four hundred and fifty-two quarts in one month, and fifteen quarts in one day. This calculation is based on thirty days to a month, which would give three hundred and sixty days to a year. Fifteen quarts per day for that length of time is a very large yield. By deducting therefrom the time the cow in natural course would have stood dry, the average actual yield per day would be increased, as the same quantity would be divided by a less number of days.

In conclusion, permit me to say: take these statements into consideration. Should your cows show a greater yield of milk, collectedly or singly, let us know what the quantity is. Should it be less, (if it is possible,) bring them up to the same standard.

THE NEGATIVE SIDE OF THE GUENON SYSTEM.

By EASTBURN REEDER, *Member from Bucks.*

FIRST ACQUAINTANCE WITH THE SYSTEM.—April 1st, 1854, I commenced farming. My herd consisted of four cows, and they were not of the best quality. Some time during the year I purchased this book, "A Treatise on Milch Cows, whereby the quality and quantity of milk which any cow will give may be accurately determined by observing natural marks, or external indications alone; the length of time she will continue to give milk, &c., by M. Francis Guenon, of Liborne, France." The work was published in this country by Thomas McElrath, of the *Tribune* buildings, New York, in 1853, and was at that time extensively advertised in the agricultural papers of the country. I read the work with interest, studied it carefully, and, upon the testimony of the agricultural socities of Aurillac and Bordeaux, accepted the system as true. I began immediately to look around for a "Flanders first," or, a cow of the first class, first order. I did not succeeded in finding one until the summer of 1855, when I purchased a two year old heifer of Dr. Isaiah Michener, of Carversville, Bucks county, Pennsylvania. I recollect perfectly well of exhibiting this heifer at an exhibition held in Doylestown in the fall of 1855, when I spent a great portion of my time in calling the attention of the passing crowds to the new and wonderful discovery, both by placard and by oral explanations. I was very proud of my cow and kept her until she died in 1868, aged fifteen years. She proved to be a good cow, one that would yield from sixteen to eighteen quarts of milk a day when in full flow, making ten pounds of butter a week, and would milk up to her time of calving. She did not, in any respect, belie the truth of the system. The following spring (1856) I purchased another cow (Flanders first) at a public sale. This cow had a record of making twelve pounds of butter a week, and brought at that time the unprecedent price of seventy-eight dollars for a native cow. She, too, proved to be a good milker, and made for me nine pounds of butter a week. So far I had no reason to doubt the truth of the Guenon system.

EFFECTS OF THE ALDERNEY CROSS.—A few years later I determined to try the effect of an Alderney cross upon my cows, with a view to improve their butter-making qualities. The Alderney bulls, however, had such poor escutcheons that I feared to try the experiment. The first cross brought me a Flanders second out of my cow No. 1. I kept this cow also until she was old, and never could see but what she was fully equal to her dame in every respect, although according to the system, her yield of milk, both in *quantity* and in *duration*, should have been diminished. In course of time I procured another Alderney bull and crossed him with my Flanders second. This cross gave me a Flanders fourth, with large blemished or bastard marks in the escucheon. In other words, "the *mirror*" was bread half away, and yet the cow is a better one than either her dam or grand dam. This cow is in my dairy to-day, was examined by the commission June 1, 1878, and I shall have occasion to refer to her again. She affords one of my strongest proofs against the truth of the system. For if we can breed the mirror or escutcheon away without diminishing the milking qualities of the cow, either in *quantity* or *duration* of yield, it is very hard to imagine what connection the escutcheon has with milk production.

GUENON'S CLASSIFICATION.—Before proceeding further, perhaps it will be best to explain a little more in detail what the Guenon system is. The author of this system divides all cows into eight classes, and each class is again sub-divided into eight orders, making sixty-four different kinds of escutcheons and as many different kinds of cows. By a reference to the chart it will be seen that each class and each order is illustrated by an appropriate engraving, representing both the outlines or form of the escutcheon and the quantity and duration of the yield.

I object to this classification as being only an approximation to what we find in nature. Instead of there being only sixty-four different kinds of mirrows or escutcheons, I have found them to be as varied and as numerous as are the animals composing the female portion of the bovine race, no two of them being exactly alike. In this particular respect they are as various as the human countenance, and the attempt to get them all into eight classes and eight orders makes it extremely difficult, often, to decide where a cow actually belongs. Guenon, however, recognizes but one perfect mirror, and that he calls his "Flanders first, or first class, first order." This is the only cow that will yield twenty quarts a day and not go dry. The surface covered by this mirror occupies all the space for an escutcheon, and the remaining sixty-three are to be regarded as falling more or less short of what he regards as perfection. For all practical purposes, we may truly say there is but one perfect escutcheon, according to Guenon, and all the rest are to be regarded as imperfections of the first in all their various degrees. The extreme range of quantity and duration of yield in these sixty-four different escutcheons, is from the Flanders, first of twenty quarts a day, and nine months in milk, all the way down the sixty-four descending steps to class eigth, order eighth, yielding but two quarts a day and milking but two months, or going dry upon being got with calf. Guenon, however, makes another sub-division in his classification of cows that must receive a passing notice. Each of these sixty-four different escutcheons he found upon what he terms "*high*, *medium*, and *low*" cows. This does not increase the number of different escutcheons, but modifies their influence according to the size of the animal. Upon this point he says, "With respect to size, I call a cow *high* when she weighs from *five* to *six hundred pounds;* of *medium* height when she weighs from *three* to *four hundred pounds*, and *low* when she weighs from *one* to *two hundred pounds*." A note to this remarkable paragraph explains that this is French weight, and to reduce it to English avoidupois we must add eight pounds to every one hundred pounds. This makes it a little better, but according to his own statements, it is plain that Guenon never saw what we regard in this country as a full sized, first-class cow. How then are we to apply the system to our cows? If a Flanders first *high cow* will yield twenty liters a day, the *medium* sixteen liters a day, and the *low* cow twelve liters a day, are we to apply the rule to our larger cows in the same ratio? If so, our twelve hundred pound cows ought to yield forty quarts per day to be in the same proportion. The high cow of Guenon, yielding her twenty quarts a day, is about equal in weight to our average two year old heifer; his medium cow, yielding her sixteen quarts of milk a day, is about equal in pounds to one of our average yearlings, while his low cow, yielding her twelve quarts of milk a day, ranks in weight with a good sixed calf six weeks old. Imagine a cow, weighing but two hundred pounds, giving twelve quarts or twenty-four pounds of milk a day; her yield of milk equaling her live weight every eight days. Or, take the high cow, weighing six hundred pounds and yielding twenty quarts or forty pounds of milk a day, her yield of milk equaling her live weight in fifteen days. What are we to think of this? Are we to accept it as true? And if true of the cows of France, how are we to apply the system to the cows of our own country.

IF THE SYSTEM IS TRUE, WHY?—That cows vary greatly, both in the quantity of their yield, as well as the length of time they will continue to give it, is a proposition none of us will deny. Why is this so? Does it depend entirely or in part upon the escutcheon? I have often asked the advocates of the system: Why is it that a Flanders first will yield twenty quarts a day, and milk nine months after being got with calf; a Curveline first yield but eighteen quarts a day, and milk eight months, &c., down the scale? and I have not yet found the man to answer the question. The reply has been invariably: "We find by experience that the facts are so, but the reason we are unable to give." Now, if the facts are so, there must be a cause or causes for them. There is no effect produced without its corresponding cause. Again, I propound the question—this time in rather different form—why do cows vary so in their yield of milk? Is it because they have different escutcheons, or does it depend more upon the food they eat, the constitutional power they individually possess of digesting and assimilating that food—first converting it into blood, then into milk? I must confess to taking but very little stock in the first or escutcheon answer, and own to hanging my faith upon the second answer to the inquiry. What then are the signs of milk production? Milk is essentially a female product, and the *first* indication to be looked for in the animal producing it is a *feminine form.* Nature has provided all races of animals with both male and female forms, and in no race is this distinction of sex more clearly defined than in the bovine.

REASON ASSIGNED BY MAGNE AND ARNOLD.—The nearest approach, and perhaps the only effort, to connect the escutcheon as being the cause or effect of milk production is that quoted by Prof. Arnold in his work on American dairying. On page fifty-eight, he quotes as follows: "The connection of the escutcheon with the flow of milk is accounted for by Magne, who says that the hair turns in the direction in which the arteries ramify, and that the reversed hair on the udder and adjacent parts indicates the termination of the arteries which supply the udder with blood. When these arteries are large, they are not confined to the udder, but extend down through it, and upward and outward, ramifying on the skin, beyond the udder, giving the hair the peculiar appearance which distinguishes it from the rest of the surface. If the arteries supplying the udder with blood are very small, they are not likely to extend much beyond the udder, and hence form a small escutcheon. Hence a small escutcheon indicates a feeble supply of blood to the udder, and consequently but little material to make milk of, and hence a small flow of milk."

Now, is this sound philosophy, or good anatomy and physiology? When Mr. Hardin showed this paragraph to one of the most learned medical professors in Louisville, Kentucky, he at once wanted to know who this

Magne was, and declared his name unknown in the annals of medical science. Is it a fact that the arteries ramify more in one cow than another? Has one cow more arteries than another? You might as well tell us that one cow has more bones or more muscles than another. The arteries are the same in all, and ramify alike in all, extending all over the cow's body, terminating in the small ducts, or capillaries, connecting them with the venous system of circulation. And again, how is it that the ramification of the arterial circulation *causes* the hair to grow in one direction on a certain portion of the cow's body, and in the opposite direction on other parts of her body? This is another question for Magne to answer. The only difference I imagine in the arteries and veins of cows is in their *size*, and not in their *numbers*. And *size*, connected with *activity*, is the true measure of power. The extent of the ramification of arteries must of necessity be limited by the size of the animal, covering the entire surface, for we cannot insert the point of a needle without touching one of them, and bringing blood.

THEORY OF MILK SECRETION.—Let us next consider for a few moments the question of milk secretion, that we may better understand the subject. Williard's Practical Butter Book quotes Prof. Simonds, as follows (page 38): "The secretion of milk forms no exception to the rule which obtains with reference to animal products in general, viz: *that is formed arterial blood.* So large an amount of milk as is often known to be furnished in a few hours by the cow, necessarily requires a corresponding quantity of blood for its secretion. We find, therefore, that the arteries going to the udder are both large and numerous, and the branches of each freely anastomose (or unite by their mouths), so that no interruption to the regularity of the supply of blood to every part of the gland may take place."

What then is the mode of action of the mammary glands in secreting milk? Do they fabricate in themselves the proximate constituents of milk by the agency of cells? or, do they merely strain it from the blood, in which it pre-exists? Prof. Draper, the well known physiologist, says that authorities differ in regard to this question. He also says that "the influence of special structure is disproved by the numerous well authenticated cases on record, in which other portions, or glands, have assumed a vicarious action, and secreted milk." He infers, therefore, that the proximate constituents of milk are not manufactured by reason of any special structure of the gland which secretes them, since other structures or glands can assume this vicarious action, and do the same thing. The question is argued by Draper at considerable length, and he concludes from the data on hand respecting the origin of the different constituents of milk—the caseine, the butter, the sugar, and the salts—that he may come to a definite conclusion regarding the physiological action of the mammary glands. And, as it appears that all the constituents which its secretion contains are found in the blood, we can scarcely suppose that the gland itself does more than merely strain them out. But, of course, in common with all such structures, it possesses what may be aptly termed *an elective filtrating power*—permitting the exudation of some substances from the blood, and refusing a passage to others. Dr. Sturtevant, in a recent lecture before the Connecticut State Board of Agriculture, has taken the same view, so far as relates to the formation of the butter globules. Other physiologists, however, take the ground that the sugar of milk—caseine and true butyrine—have a doubtful existence in, or have not been clearly recognized in the blood, and hence, that these constituents are formed in the mammary gland. Lehmann says, "We cannot assume that the constituents of milk preëxist in the blood," but he is inclined to favor the view that there occurs a remodeling of the substances conveyed by the blood to the glands for secretion, and that the main constituents of all true secretions, like those of the liver and mammary glands, "are first formed within the glandular organs themselves."

THE ESCUTCHEON AS CONNECTED WITH MILK SECRETIONS.—But no matter which theory prevails, we must next consider the structure of the udder itself, the manner in which it is divided, how it is supplied with arteries and glands, and their relation to the escutcheon of Guenon. Guenon studied and explained his marks only as they appear on the rear portion of the udder, and the marks described by him were supposed to apply to the entire udder. This, Prof. Arnold says, cannot be true. "Each quarter of the udder is supplied with blood by a distinct and separate arterial branch' and these may, and often do, vary considerably in size in the respective quarters. Those supplying the two hind quarters of the bag are usually larger than those which supply the front quarters, but sometimes the reverse is true, in which case the marks on the back part of the udder would not be a correct indication of the front part, and so with other inequalities. Each quarter of the udder has an escutcheon for itself, made by the ramification of the arterial branch supplying it with blood, and which serves as an index only to that division of the udder. If there is more escutcheon on one side or quarter than the other, it indicates a flow of milk from that side or quarter corresponding to the excess of development." This, my experience tells me, is not true. We often find cows better marked on one side than the other, without any difference in the yields of milk from the quarters or sides of the udders. If the principle is true as stated, it proves too much; for if a cow loses a quarter of her udder by accident, the escutcheon should disappear along with, or soon after, said loss; otherwise, it is not a correct indication. If the supply of blood to the udder, or the yield of milk from it, *causes* the arteries to ramify and produce the escutcheon, then is the escutcheon dependent upon the flow of milk, and not the yield of milk dependent upon the size or shape of the escutcheon. Large udders, large arteries and veins, must produce large escutcheons if this theory be true.

THE ESCUTCHEON NEITHER CAUSE NOR EFFECT.—But, again, a little further on (page 60) Prof. Arnold says: "None of these indications, taken singly, is an infallible evidence of large yields; they must be considered together. A large escutcheon and milk veins, *coupled with a small stomach*, should be *marked down at least one half* what they might otherwise signify; and a large digestive apparatus, coupled with small milk veins and escutcheon, should be marked down in the same way." Or, in other words, the influence of the stomach modifies the effect of the escutcheon by one half; and the influence of the escutcheon has the same effect over the action of the stomach. This takes away at least one half of the truth of the Guenon system, and the learned professor cannot be set down as more than a half believer in it. Let us see, for a moment, how this works in practice. Guenon says a genuine Flanders first will yield twenty quarts of milk a day, and milk nine months after being again got with calf. Prof. Arnold says she will, *provided* she has a large stomach, but if she has a small one, she will not do more than half as well; that is to say, not give over ten quarts a day, and milk over five months. And, again, the cow with a large stomach and a small escutcheon must also be marked down (Prof. Arnold says) in the same way. Thus, a Flanders eighth, with a large stomach and milk veins, set down by Guenon as yielding *four* quarts a day for *two* months, would only yield *two* quarts a day for *one* month. This last proposition, if true, destroys every vestige of truth in the Guenon system. That a cow with a large escutcheon and a small stomach should be marked down in her yield is reasonable, but that a cow with a small escutcheon and a large stomach should also be marked down appears to me as absurd. In this case, it is neither cause nor effect. This, also, proves to us that it is the stomach that does the business, and not the escutcheon. And, in the case of the cow with a large stomach and small escutcheon, I would like to inquire, what becomes of the milk constituents contained in her blood? This brings us to the consideration of another point.

NATURAL CHARACTERISTICS, OR TENDENCIES OF COWS.—We find, in cows, two distinct and directly opposite tendencies. One of these is the secreting and laying on of flesh and fat; the other, is the secretion of milk, and the consequent taking off of both flesh and fat. I affirm it as a cardinal principle in my philosophy, that the secretion of milk, both in quantity of yield, and duration of flow, depends altogether upon the constitutional tendency of the animal, and not upon the size of the stomach, the amount of blood, or the shape of the escutcheon. A cow may have a large stomach, and be a poor milker; she may have a great amount of blood, a large escutcheon, and still be a small milker. The constituents of the blood may be absorbed by other glands than the mammary. I have heard the disciples of the Guenon system, members of this Board, declare that the system is equally applicable to the selection of milkers or feeders. (See *Practical Farmer* of November 30, 1878.) Gentlemen, how can this be? Directly opposite natures or tendencies recognizable by the same sign! The proposition seems strangely paradoxical. The cow that is the largest, and the longest milker, will, if turned dry, prove the quickest and the best feeder. If this is true, she can as readily change her nature as the chameleon his color. But it cannot be true. As before stated, the power of an organ depends upon its size and its activity. The mammary glands, stimulated to action for a long time, and the sebaceous, or fat secreting follicles and glands correspondingly dormant, it cannot be possible that the sudden and forced cessation of action of the former, in the animal economy, would be the signal for the springing into healthy and vigorous action of the latter. It would be just as reasonable to suppose that the right arm of the blacksmith, trained, by long practice and continued exercise, to execute certain movements, could suddenly transfer the same power and skill to the left arm, as to suppose that the milk secreting tendency can be suddenly changed, and the fat secreting tendency at once vigorously established. We might as reasonably expect a machine made to make paper to be equally good in making pens.

SUPPORTED BY TESTIMONY.—Prof. E. W. Stewart, in an article published in the *Country Gentleman* in December 5, 1878, bears important testimony upon this point. In answer to the question "how often should young cows calve for profit?" He says that "heifers should come in at two years old, in order that the milking tendency may be *early* established. Three-year old heifers, he says, if well kept, are more likely to form the tendency of laying on fat." The dairymen upon the island of Jersey have practiced the early breeding system for a long time, and believe it results in better milkers. This habit, started early, should be stimulated and developed so distinctly during the first milking period that it becomes fixed in the system. The value of a cow depends more upon how long she will hold out in her yield than upon the quantity of her yield at the flush. To fix a long milking period the heifer should be milked at least twelve months, and the professor thinks eighteen months still better between a heifer's first and second calf. He closes the article with the significant remark, that "this statement pre-supposes that the heifers are well fed from calfhood—always well fed—as food, and nothing but food, makes milk." If food, and nothing but food, makes milk, what connection has the escutcheon with milk productions?

BASTARD MARKS.—Another point I desire to notice, is what Guenon terms his marks denoting bastard cows. The perfectly marked cow is the Flanders first. Any *down-growing* hair in this escutcheon is a bastard mark, detracting from the value of the cow in proportion to its size. While in the cases of the other classes of Selvage, Curveline, Bicorn, Demijohn, Square-Scutcheon, Limousine, and Horizontal cut cows—patches of *up-growing* hair *outside* of the limits of these different escutcheons, but *within* the limits of a Flanders first are also considered as marks of bastardy. There is an apparent contradiction here. Why should down-growing hair be considered a bastard mark in one case, and up-growing hair be considered as bastard marks in other cases? Or, why should down-growing hair in the Flanders first, second, or third, and up-growing hair in the Curveline, or horizontal cut, both occupying exactly the same location, have the same effect of deterioration in both cases? Why is down-growing hair a bad sign in the one case, and up-growing hair a bad sign in other cases? These contradictions may well make us question whether the hair upon the escutcheon ought to grow upwards or downwards. If the general principle that up-growing hair is the best escutcheon, as on the Flanders first, why should not the same thing occur in other mirrors be regarded as good, and not as bad signs?

THE STATE COMMISSION.—At our last annual meeting, I said something upon this subject, and recommended the engagement of Cornelius Baldwin, of Ohio, whom I had recently heard at the American Dairymen's Convention, at Cleveland, to explain and give practical tests of the system. This proposition did not find any favor, because it was said we had so many experts in the system citizens of our own State. Accordingly, on the 24th of April, 1878, our State commission was appointed. Before they commenced their labors, I expressed the desire to the Secretary of our Board, and to the secretary of the commission, that they should test the system of Guenon only, and not judge of the animals offered for their examination by any other marks or points. The labors of our commission are now completed, and their report published in our quarterly reports. It is now, I take it, public property, and a fair subject for discussion. In the quarterly report for June, July, and August, the secretary of the commission makes the statement that "another opponent of the system has made the statement that we judge of a cow by other points than those of the Guenon system. To whom this refers I do not know; but here let me state what I consider to be strictly testing the Guenon system: when a cow is brought out for examination, let the commission say to which class and order she belongs, and then append the figures of Guenon as the result. Any other mode of proceeding is not testing the Guenon system. Having carefully examined the report, I submit the following objections: 1. They have, in some cases, failed to classify the cows. 2. They have, in some cases, made incorrect classifications. 3. They have, in some cases, given different results from Guenon. 4. The terms employed to denote quantity, quality, and duration are too vague, indefinite, and unsatisfactory.

FIRST OBJECTION.—FAILURE TO MAKE CLASSIFICATIONS.—In Thomas M. Harvey's herd, cows No. 6, 9, 14, and 17 are not classified. By what system were they examined? Of No. 6, they say, "milks profusely, and keeps herself thin on account of it—good milk. Mr. Harvey says of her, "quality good, quantity twenty-four quarts—will milk on." Was this cow a Flander's First? If not, the system is disproved in her case. Of No. 9, they say, "strangely and imperfectly marked, quality good, quantity poor, will dry up soon." What is the matter here? Were they not able to classify this cow? Mr. Harvey says of her, " quality first rate, quantity ten quarts, dry two months." Of No. 14, they say, " ordinary stock, quality not very rich, but good, quantity good, dry two months." Mr. Harvey says of her, " quality good, quantity twenty quarts, one month dry." Here should have been another Flander's first, for Guenon recognizes no other as giving twenty quarts. Of No. 19, they say, " Bicord second, quality first class, quantity first rate, milk well up." In this case the cow is classified and given all the good qualities of a Flander's first, while Guenon says of Bicord second, " quantity fourteen quarts, dry two months." Mr. Harvey says of No. 19, " quantity sixteen quarts, dry six weeks." Is No. 19 incorrectly classified or incorrectly judged?

In the examination on the farm of Thomas Gawthrop, where the cows were blanketed, occur some remarkable statements. Cows No. 1 and 2 are not classified. Of No. 1, they say, " quantity first, quality first, up to her time." Of No. 2, they say, " quantity first, quality first, short eight weeks." If these cows are both alike in quantity and quality, why does No. 1 milk up to her time, and No. 2 go dry nearly two months? Mr. Gawtrop says they both milk up to their time. What Guenon would say about them we don't know, because—not classified. Of No. 8, they say, three fourths Jersey, Flander's third, quantity second, quality first, dry six weeks. Her Jersey blood helps to overcome some blemishes on her escutcheon." Here we have the admission from the commission that we must consider the blood as well as the escutcheon. This cow was blanketed.

SECOND OBJECTION—INCORRECT CLASSIFICATIONS.—Of course my opportunities in this respect are very limited, having seen but few of the cows examined. In my own herd of No. 1, they say: " Flanders second—quantity, eighteen to twenty quarts; quality, fair; dry three to four months." Guenon says of the Flanders second—dry one month. I should have classified this cow as a Flanders fourth, and she milks to within a month of calving. In the case of this cow we have, first, (if a Flanders fourth,) the system disproved as to duration, and second the cow not judged by the commission according to Guenon. This is the cow alluded to in my opening as the result of two Alderney crosses, and the escutcheon reduced from Flanders first to fourth. The cow cannot be a Flanders second and go dry three or four months; neither can she be a Flanders fourth and milk up as well as she does. Of No. 2, they say: " Curveline second—quantity, sixteen to eighteen quarts; quality, first rate, dry two months. There again I must say wrongly classified. If they had said " strangely marked " no one could object. I should call her a *double Curveline*—(accompanying is drawing No. 2, a correct representation of her escutcheon.) Indeed, her escutcheon is not provided for by Guenon on his chart, nor by any of his followers whose works I have seen. Of No. 3, they say: " Demijohn second—quantity, twelve to fourteen quarts; quality, medium, dry two months." I make no objection to the classification of this cow, but instead of going dry two months, she has milked for six years. In this respect she is like Mark Hughes' cow No. 2: " Has never been dry; begins to increase in her milk about three weeks before calving, and cannot be turned dry." In the classification of Mr. Hughes' three cows, Flanders second, Demijohn first, and Curveline first, they are all set down by the commission as milking up to calving, in opposition to Guenon. Cow No. 4, in my herd, is set down as Flanders third; quantity, sixteen quarts; quality, first rate, dry one month. Guenon says the Flanders third goes dry two months. In this case the commission are correct, and Guenon wrong. This cow also presents a case, as will be seen by drawing No. 4, of the escutcheon inclining to one side, or being imperfect on the right side. Cases of this kind, according to the theories of Magne and Arnold, should be accompanied with milking more upon that side of the udder corresponding to the perfect escutcheon. I am unable to find it to be the case however, and this furnishes another evidence that the escutcheon has no connection with milk secretion—that it is neither cause nor effect of milk production. I do not wonder that the commission found difficulty in making classifications. In the endless variety of escutcheons that will come to their notice, it will be impossible to assign them all to *sixty-four* classes, particularly so when some of those classes so closely resemble each other. As an example of this—where is there much difference between a Selvage sixth, seventh, and eighth, and a Limousine second, third, and fourth."

TESTING THE GUENON SYSTEM.—Objections third and fourth will be considered under this head. What constitutes testing the Guenon system? As before stated, in my view, all the commission had to do was to locate the cow in the proper class and order, and then let the work of Guenon decide upon the quantity she will yield, and the length of time she will give milk. Out of one hundred and seventeen cows examined, as published in our quarterly reports, in the herds of Messrs. Sharpless, Harvey, Large, Reeder, Gawthrop, Hughes, Preston, and Darlington, ten of them are not classified at all, and seventeen more in which only the class and not the order is given, making twenty-five per cent. of the whole number not classified. The seventy-four head examined upon the farms of Messrs. Barney, Strode, Young, and Calder teach nothing to those who were not present, because the records of the commission are not published, and the statements of the owners not given, and in some instances they had kept no records, and knew nothing about their cows. Whether the classifications given, as published, are correct I do not pretend to question, excepting the cases already mentioned. Whether the yield in quarts, the duration in months, compares correctly with the figures of Guenon can readily be ascertained by a comparison of the two. Whether the terms employed in denoting quantity, quality, and duration are satisfactory, I leave for the public to judge. Let me give an example or two of how I think the examination should be made: Here is a cow, Flanders first. Guenon says she will yield twenty quarts a day, and not go dry. Another, Selvage second, will yield sixteen quarts a day, and dry one and one half months. Another, Curveline third, will yield fourteen quarts a day, and dry three months, &c. Such an examination would be testing the Guenon system. But when the cows are not classified; when their yield in quarts, and their duration in months, are not expressed; when the quality of the milk is passed upon, there is a failure to test the system. All such terms as first class, second class, first rate, second rate, good, fair, medium, best, inferior, poor, very fine, not very fine, light, &c., &c., should be discarded. In the examinations upon one farm, it appears (that of the Messrs. Darlington) the terms to be employed in estimating the qualities of the cows examined was made a matter of mutual agreement beforehand, thus leaving Guenon out in the cold.

THE SYSTEM IN OTHER HERDS.—At the last exhibition of our county society, I made it a part of my business to examine most of the cattle on exhibition, (over one hundred head,) and did not find a Flanders first in the whole lot. I believe them to be as scarce as one in a thousand, and perhaps even ten thousand. The herd of Guernseys owned by Ezra Michener stood next to my own herd of Jerseys, and together we made the examinations, a few of which I will give.

No. 1. Rosalind.—Full Guernsey; three years old; class, Limousine; order, third; dropped her first calf in April, 1877; gave, in June, thirty-two pounds of milk a day; would have milked up to calving, but was made to go dry one month; dropped her second calf in May, 1878. According to Guenon, this heifer should have yielded only ten quarts, or twenty pounds a day, and go dry three months.

No. 2. Beauty.—Grade Guernsey, seven years old; class, Flanders; order, fourth; gives forty pounds or twenty quarts of milk a day when fresh; makes twelve pounds of butter a week, and goes dry one month. According to Guenon this cow should yield only fourteen quarts a day, and go dry three months.

No. 3. Susie.—Grade Guernsey, six years old; class, doubtful; might be a Selvage sixth or seventh, or a Limousine second or third; gives thirty pounds of milk a day, and does not go dry. Guenon sets the selvage sixth down for eight quarts a day, and seven months dry; and the Limousine second at twelve quarts a day, and two months dry. In either case "the system" suffers fearfully in comparison with Mr. Michener's statement.

No. 4. Blanche.—Grade Guernsey, four years; class, Flanders; order second; gives when fresh twenty-five pounds, or twelve quarts of milk a day; goes dry two and a half months. According to Guenon the Flanders second should give eighteen quarts a day, and go dry one month. Mr. Michener regards her as the poorest cow in his herd, and she is certainly the best marked. We next examined the dairy cows on trial, entered for milk production, and which were required to have three trials at intervals of two months, viz: the second, fourth, and sixth months after calving.

No. 1. Tulip—Grade Holstein, six years old; owned by Charles L. Allen; class, Flanders; order second; gave September, 1878, fifty-three pounds of milk a day—her first trial after calving.

No. 2. Rose.—Grade Devon or Native, six years old; owned by Lukens & Bisson, of Doylestown; class, Flanders; order third; gave in June, 1878, sixty pounds of milk a day; fresh in February, and being a second trial required after calving. Other cases might be given, but these will suffice to show what reliance can be placed in the system.

CONCLUSIONS.—In conclusion, I cannot adopt the sentiment of Colonel James Young, as reported by our commission, when he says, "He never saw a good escutcheon without being on a good animal; and never saw a good animal without a good escutcheon." My experience has been different. I have seen good cows with good escutcheons, and good cows with poor escutcheons; and I have also seen poor cows with poor escutcheons, and poor cows with good escutcheons, in so many cases that the system cannot be relied upon.

The points I have endeavored to establish in this essay are:

1. The escutcheon is a mark that can be bred, in or out, without improving or decreasing the value of the animal.
2. Guenon's system and classification furnishes no standard for correctly judging the cows in this country.
3. There is no valid reason that can be given why the system is true.
4. The study of the physiology of milk secretions, reveals to us the fact that the escutcheon of Guenon is neither cause nor effect.
5. Distinct and directly opposite tendencies or natures cannot exist in the same animal at the same time, and be recognizable by the same sign.
6. The marks of bastardy are contradictory in themselves, and tend only to mislead and confuse the examiner.
7. The system fails in so many instances that it cannot be safely depended upon.

DRAINING WITH STONE.

By Colonel James Young, *Member from Dauphin.*

There two ways of draining under this head. First, under the soil; and secondly, surface draining. As under-draining is the best method where practicable, that will first receive our consideration. In this latitude it seems that all soils are improved by the artificial drawing off of surplus water. Where this is to be done by the underground plan, the first things to be considered are—Where does the water to be removed by this process come from? And where should it be taken? The lowest point of the field should be the base of operations, and there is where the main under-drain should be laid. From this point the branches may be run up to the side hill or hills, in such a way as to reach the winter springs by the utmost direct and economical route. The best plan is to start from the low ground first, gradually ascending to the higher elevations requiring drainage, and always aiming for the points most necessary to be drained, which are generally the winter springs.

The depth of a drain is of great importance. Of course you must penetrate beneath the soil. If clay is first encountered, it is necessary to go below that; and usually at the right depth there is either gravel or shale. At any rate the point is to go down to where the water is, and deep enough down to drain the soil around to the desired depth. There is a saving of neither time nor money by making drains so shallow that the plow will disturb them at any time thereafter.

After the trenches are dug, and you are fully satisfied that all the places requiring drainage have been reached, then the plan is to start at the heads of the laterals, and work down towards the main under-drain. If the water to be carried off is in large quantity, then the drain should be wide enough for the purpose. If the amount of water to be carried away is comparatively small, the drain at the bottom can be made the width of a shovel. To ascertain the quantity of water that should be drained off a certain area of land requires some knowledge of the work; and a person before attempting the experiment ought to have observed the plans of others of experience. A drain too small leads to vexation, and one too large leads to much unnecessary expense; for an immense quantity of stone can soon be used up in some drains of inconsiderable length.

Supposing we have the trenches in their most effective positions, and the laterals where they will take off the surplus water, especially from the winter springs; then the question arises, what shall first be used in filling up a trench that may become a drain? My plan is to take stones of good size, size, with pointed ends, and place them at the bottom of the trench, the points downward. This will leave numerous openings at the bottom of the drain, through which the water can always flow, without interruption, on to the main outlet. After the pointers are laid at the bottom of the trench, in the manner described, for a distance of fifteen or twenty feet, then good-sized stone are put on the top of them in such a way as also to help the drainage. On the top of those again a layer of smaller-sized stone, and so on until there are three or four distinct layers of stone above the pointers, the largest stone coming first, and so on to the smallest, in the manner described. With us, these stone are designated "first-class," "second-class," "third-class," and "fourth-class." With a drain of ordinary size, the first-class stone would average, say, from four to six inches in diameter; the second-class stone would be from three to four inches in diameter; the third-class from two to three inches, and the fourth-class would be what might be termed "large gravel," or offall from the large stone. With a very large drain, of course the stone might be increased in size somewhat, though the top should be covered with the smallest stone or gravel, the same as with smaller drains. After the fourth-class stone are on, then the whole is covered with cinder or gravel; on the top of which is placed either straw, hay, grass, or weeds, particular care being observed that every part is well covered. Then, on the top of this comes the soil, of requisite depth. Special attention is called to the thorough covering of the gravel or cinder with straw, (or whatever is used,) for the reason that if the earth is permitted to find its way through as soon as, or soon after, the drain is covered, there will sooner or later be no drain, the earth dropping through into the holes for drainage and closing them up; and when drains are thus clogged, it is a task of no small magnitude to open them again.

As to the depth of a drain, no general rule of feet and inches can be given; the constructor having to be governed by the fall of the water, the amount of stone necessary to make the drain serviceable, and the depth to which the plow will very likely go.

With small drains, the lower stones, or "pointers," need not be as large as in larger drains: but the way to do it is best learned by watching how others do who have had experience sufficient to cause them to lay their drains wisely. If I had acted upon this suggestion in the beginning of my drainage career, I would have saved much trouble, mortification and expense. Long experience has led me to believe that the "pointer" method is the best, for the reason that the drain thus made is more durable, is very effective, and there is no such thing as part of it giving way, to the probable making useless of the entire balance of the drain.

In connection with under-draining, my experience has led me to believe that you must always have a place somewhere for the surface water, if possible. Outlets are absolutely required. Perhaps one of the best ways of doing this is to make use of the nearest running stream. I usually fix up a stream for this purpose by putting in side walls of stone, without mortar. These walls have a slope sufficient to prevent to stone dropping out or being carried away by ordinary floods. By this method no land is washed out, the soil is retained, and one is enabled to farm up close to the stream's edge. By putting in a good foundation and backing, when these walls along the stream are laid, and excellent drain is formed for the surrounding territerritory; the water percolating or flowing through going directly into the run, and passing off. Where there is so much fall in a run, thus walled, that there is danger of it washing away or injuring of the sides or the bottom of the run, tumbling dams can be placed in the stream with profit. They not only prevent washing, but in course of time they collect a large amount of rich manure, which otherwise would either go to waste, or lodge on some neighbor's lands. These dams ought to be cleaned out now and then, and the deposits scattered over the fields.

For both under and surface draining, where stone can be used in the manner given, they are decidedly the most profitable in the long run. I have tried both tile and stone, and am of the firm belief that where stone can be had in a sufficient quantities, they are the best; otherwise tile, for the latter are much preferable to no drainage at all.

As there seems to be one branch on the subject of drainage by stone not yet touched upon, it may be well to refer to it by way of conclusion. It is where there are no appearent outlets for the flow of water from the under-drainage. In that case a broad well or cistern can be dug in the lowest part of the land to be drained, large stone placed at the bottom, with smaller stone on top, and then cinder or gravel, with a final covering of soil. It is surprising what quantities of water one of these artificial basins will hold, and how thoroughly they will supply the place of a running stream as an outlet.

Finally, these methods are presented to show that there is no insurmountable obstacle to the making of all our farming land more fertile, valuable, and profitable, by thorough under and surface-draining.

THE CARE OF FRUIT TREES.

By CALVIN COOPER, *President of the Lancaster County Agricultural Society.*

In undertaking the task of writing an article on the above subject, and not having had a large experience, I shall endeavor to give you a few thoughts in as plain language as my rhetoric can command.

The care of fruit trees is ofttimes too much neglected. To begin right is of the first importance. The prevailing habit with some persons has been to cram the trees into the smallest possible hole, in an out-of-the-way plot or fence corner, not, in their estimation, fit for anything else, and expect the trees to live and flourish under such treatment. Many of these usually fail the first year, or at least languish a few years and die for want of a little care and attention; when the planter heaps his condemnation upon the nurserymen or tree vendor, for having sold him diseased or worthless stock.

Location *should* be the first consideration; rolling ground is always preferable, though not always accessible; would prefer a north-easterly slope as the *most* desirable, with the altitude as great as circumstance will allow. In adopting such a site, you will have perfect drainage, a much lighter and less humid atmosphere, also have some protection from the afternoon sun on mild winter days that in this climate sometimes follows excessive cold. The sun striking the trunk in the after mid-day, warming one side while the other remains frozen, is often the cause of the bark bursting, and not unfrequently is followed by the distruction of the tree. This, however, can in part be avoided by growing the trees with low tops, to which I shall allude hereafter. This injury generally occurs about the time the trees begin to bear, and also when there is no shade except from the denuded branches of the tree itself. You can readily perceive that a slope of from ten to fifteen degrees would elevate the tops of the upper trees sufficiently to afford some shade to each succeeding row. To assist in this protection and to occupy the ground while the trees are small, (more particularly the apple and standard pear,) I would advise the planting of a peach between each apple; and, indeed, a row between each apple row would, by their quick growth, materially assist in this winter protection, to say nothing of the fruit they would produce before the apple commenced to bear or occupy the whole ground.

Cultivation is by no means of secondary consideration, but I believe of vital importance, and thorough tillage of the soil is necessary for the first few years to induce a good healthy growth. It is, however, necessary to use some discretion to preserve the surface soil on hilly ground. Should it be of a clayey or tenacious character, which is not often found on high hilly ground, there will be less danger of wash and waste from the cultivation. On the other hand, if the soil be a light porous shale some care must be taken to avert the loss of the very material it is most important to preserve. Summer crops will not be injurious to the trees, provided the fertility of the soil is kept up by the application of the proper manures. Corn, potatoes, and, indeed, all vegetables and most of the small fruits, for the first few years may be grown with advantage, and fully compensate for the labor in the tillage and leave a handsome profit besides. Care should always be taken not to impoverish the soil by this system of double taxation. An annual dressing of manure or some other good fertilizer will keep it in good heart while this treatment is pursued.

The question of cultivation or non-cultivation after the trees have attained a bearing age is a question on which many of our most successful horticulturists disagree—each advocating his theory as the basis to be relied upon. Doubtless, both have their advantages on some points that are difficult to overthrow. I am, however, very decidedly in favor of no cultivation after the trees are ten or twelve years planted, or, say half grown. It has been my practice to top-dress with stable manure every two or three years, with an occasional dressing of lime or unleached wood-ashes, about one bushel to each tree, which, in my opinion, will materially assist in keeping them in health and productiveness. We generally cut the first crop of grass and feed as a green crop. All after-growth of grass or weeds is either cut for a mulch or trampled down and allowed to remain. But no grass or other vegetable matter should be permitted to grow within three or four feet of the trees. This we try to prevent by the annual application of the finer parts of coal ashes, and also think it assists in preventing the ravages of that little pest of the orchardist, the "borer."

Care should be taken to avoid too rank a growth. I have often heard planters exultingly speak of the great vigor of their trees, their rapid growth, &c. This is often caused by an excess of stimulants, and not unfrequently is followed by an incurable injury, if not the entire destruction, of the trees. I am fully convinced by my own observation and experience that those of moderate growth, especially the apple and pear, will be longer lived and more productive than those grown too rapidly. The former will have better ripened and more healthy wood, as well as more fully developed fruit buds.

The peach, however, requires somewhat different treatment. Not that they require less cultivation, but it should be continued while fruit is the object. The critical period is the first few years after planting—to escape the depredations of the borer, as one grub will do more injury to a one or two-year old tree than a dozen could to one full grown. Their tendency to over-bear (where the peach does well) should be guarded against by a judicious thinning or shortening of the branches, as well as to preserve the tree in shape and good condition. They are at best but short-lived.

The origin of the yellows seems as yet shrouded in mystery; but its contagious nature is too well known to a majority of peach-growers. That there are conditions which invite the malady I do not doubt, but I am unable to give any better preventative than that practiced for years—the cutting away of the trees as soon as they are affected with the disease. Some, however, assert that a severe heading in of the whole top, and the feeding of strong stimulants to the roots, will induce a new healthy growth free of the malady. In visiting a fine orchard last fall, I observed a number of trees treated in this way, with what success I am as yet unable to say. There is little doubt that good cultivation and an annual wash, prepared as you would for whitewashing, with the addition of one bushel of unleached wood to every half bushel of lime, will assist in preventing the attacks of insect enemies and give tone and vigor to the bark.

The treatment of the pear should be similar to that of the apple, while, perhaps, the cultivation might be kept up longer and to a greater depth. As the roots penetrate the soil deeper, there is little danger of injury to surface roots. Instances are not unfrequent where old pear orchards, being long seeded to grass and trees apparantly exhausted, have been restored to productiveness by a thorough tearing up of the sod, the application of some good fertilizer and good cultivation. Summer crops may be grown without detriment even though the trees are quite large, but the all important fertilizer must not be neglected. I would avoid the use of fresh stable manure, as having a tendency to increase the blight, to prevent which I know nothing better than to dismember the branches on the first appearance below the parts affected, and split the parts affected, and split the bark of the remaining branches with a round-ended knife, similar to a common case knife, from the surface of the ground to the ends of the branches. This I find immediately relieves the pressure of the hard, contracted bark, which seems to have checked the flow of sap. I have frequently noticed in the opening soon after a new bark, a pretty sure indication of a check of the disease, and, perhaps, the saving of the tree.

Proper pruning is of the utmost importance. The future tree should be modeled while in its infancy. Generally speaking, too much of it is done. The careful orchardist will, with his thumb and finger, or at the most with a common pocket pruning knife, do it while the tops can be reached from the ground. A little careful observation and thought will soon dictate to any prudent mind where the limb should be started to make a well proportioned top. Low branches are decidedly preferable; say three or at most four feet from the ground. These will assist in providing the shade above referred to. Too much care cannot be used to properly shape the tree while quite young. Should the growth be long and slender, with few or no branches, cut back to where it is desired to have the limbs start. If of a drooping tendency, head back to where there is a good and well developed bud on the top of the branch; and if upright, leave the upper bud on the outside, which will in the one case have a tendency to make the tree incline upwards, while the other makes it spread. Judicious treatment can form the tree to any shape desired. The common practice of removing the small spurs that usually form at nearly all the buds is destroying the object for which the tree is grown. These have an important mission to perform. They materially assist in strengthening the limbs by increasing their thickness, and are among the first to develop fruit buds, while if taken off, they necessitate their formation near the ends of the branches. Hence, the greater strain and liability of the tree breaking when loaded with fruit. Too large a proportion of those professing to know how to prune, make a grave error in this way: Frequently, persons making a profession of the business, travel from orchard to orchard making sad havoc upon the very branches which should be preserved. This, however, is one of the fine arts in tree-pruning, and can be much better shown by occular demonstration, than by describing.

One of the great follies with many orchardists is the attempt to double-work their orchards by half manuring, and until they learn that it is impossible to take more out of the soil than there is in it, fruit growing will be uncertain, whether the seasons be favorable or not. What kinds and quantity of fertilizers should be applied must be determined according to the constituents of the various soils. A neighbor has been quite successful by applying liquid manure from his barn-yard on the sod under his trees, and, I believe, the sewerage from the house could be used with equally good results.

Things being favorable to the production of regular crops, it is of vital importance for the grower to understand, to a certain extent, the nature and habits of insect enemies, and applying methods to counteract their depredations, else they will rob him of the benefits of a large part of his previous labors and expenses on his orchard. In planting, be sure there are no borers in before the tree is set, and annually thereafter, (until the trees have attained a diameter of three or four inches,) wrap the trunk with paper from the surface of the ground to the height of about one foot. A small mound will assist in keeping the tree in place, and prevent it coming off. Tie the tops with woolen yarn to allow for expansion. This may be removed in October, and should any borers have obtained a lodgment, they can easily be seen and removed with a sharp-pointed knife or piece of steel wire. The trees having arrived to a fruiting age, we have other enemies—the codling moth and curculio—to contend with. I know of no new method for their destruction. The wash, spoken of in a former paragraph of this article, may assist, by keeping the bark smooth and clean, prevent the former from obtaining a hiding place while passing from a chrysalis to a perfect insect. Have frequently thought these little pests might be attracted and caught by small fires set ablaze soon after dusk to entrap them on the wing. A batch of straw, tied to a pole with wire, and thoroughly saturated with tar, or some other inflammable matter, would be of but little expense, and easily carried through the orchard after dark. Gathering and removing the fallen fruit that has been punctured is, perhaps, the only means to lessen their depredations.

Having sketched the ground from the planting of the trees to its maturity, it would be most desirable to produce regular and moderate crops, instead of alternate failures and excesses. This is the question now occupying the attention of many orchardists, and, before long, it is hoped we may know how to produce a crop the off year. The evidence is strongly in favor of thinning the excess while the fruit is small, so as to give the tree a chance to develop and mature fruit buds for the coming year.

FARM DRAINAGE.

By Prof. F. A. ALLEN, *Member from Tioga.*

I am fully aware of the fact that about all that can be said upon the subject of draining has already been said by those far more able to speak upon it than I. All that I expect to do is simply to give the kaleidoscope another turn, presenting only a little different picture, but seeing the same bits of colored glass. Some one has said that "he who caused a man to think is deserving of a monument." If in this paper I can start a thought, I shall be satisfied.

I am firm in the belief that there is no question before the farmers of to-day, touching the matter of the growing crops, that is of more vital importance than this. It is *the question;* and we shall never attain to what may be termed "the farmer's millenium period" until this is accomplished. For, when we begin to examine the subject, we shall find that all such questions as deep and shallow plowing, manuring, and fertilizing, wet and dry, or long and short, seasons, all turn upon this.

"He who causes two blades of grass to grow where but one grew before is a benefactor." This sentiment contains the key to success in all kinds of business. Increased production gives increased wealth, and wealth gives increased power of doing good, and the consequent conferring of happiness upon mankind. I propose speaking of draining to this end.

If it be true that no man owns deeper than he plows, is it not equally true that no man owns deeper than he drains. In treating this subject, I shall have no reference to the draining of swamps or morasses, or the cutting off of springs at the base of hills. The man who is not up to the necessity of this belongs to a past age.

My first proposition which I shall try to demonstrate is this: All soils not classified under the head of sandy, gravelly, or light loams need draining.

Soils not thus classified are retentive or tenacious in character. Water falling upon such ground either stands in puddles for a time on the surface, or, sinking a few inches below, remains until carried off by evaporation. Water thus held is not only colder than the surrounding air, but the evaporating process by which it is carried off adds to this coldness. Such soils are in a state of saturation for a long time after heavy rains. This saturation not only excludes the atmospheric air, and thus reducing the temperature of the soil, but facilitates the formation of frosts, fogs, and mildews, besides rendering cultivation exceedingly difficult.

Poor crops, when cultivation is good, may be traced to two sources, viz: Inherent poverty of the soil, or too great moisture during the season of early growth. Manures may remedy the first, but draining is the only cure for the second.

A careful inspection of retentive and tenacious soils reveals to us two sets of pores or openings. In the one there is continuous connection, forming canals or channels. The others are made up of fine minute openings between these canals, conveying moisture by means of capillary attraction. When soils become saturated these canals are filled with water. Seed put into such soils germinates with great difficulty, if at all, and the process of growth is very tardy.

The normal conditions for the germination of seeds are the following: 1. The exclusion of light. 2. A certain degree of heat. 3. Atmospheric air and moisture. No elements of the soil are needed. Every seed has stored up within itself all the elements of food necessary until its roots penetrate the soil and its leaves reach the outer air and sunlight. Seeds will germinate in cotton or saw-dust, under the above named conditions, as readily as in the richest of soils. Any unnatural modification or exclusion of either of these conditions, militates against the germination of seeds.

The whole of plant life, after perfect germination, is subject to the same conditions, save that of the exclusion of light, and is governed by the same law. When the seed has used up the food stored for its incipient growth, it begins to send out its feelers and feeders for nourishment. Innumerable rootlets, with open mouths force their way downward, seeking for the elements essential to their growth, while the tiny shoot struggles to the light drinking in the elements from the air.

If the season be wet during seeding time, these rootlets find themselves, in a short time, immersed, though they believe in sprinkling. To them sprinkling and not immersion is a saving ordinance. Their struggle for life, with these surroundings, is difficult. They obtain a precarious subsistence, pushing their slender roots just under the surface, and thus exposed they suffer from the scorching rays of the sun at a later period of their growth. Their attachment to the soil must needs be slight, and are, therefore, liable to be blown down by the wind and storms of summer.

Again: the moisture that plants need to facilitate growth should come from above, not below. In all undrained, retentive soils there is what may be called a water-table line, ranging in depth from six to eighteen inches. Here, at this point, is a constant source of cold. From this water-table, moisture will ascend by attraction to the surface. Evaporation, as before stated, is a cooling process. Here, then, we have two causes operating conjointly to produce cold, the very thing we do not want, but its opposite, heat. How shall this be destroyed? Evidently by breaking the union of these two forces. If we can get the water of attraction below the depth to which evaporation operates, then the connection is broken.

Soils, properly drained, pass this water by slow degrees to a much lower level, and thence, by drains, outward. The moisture needed for the soil to perfect growth, is obtained from the warm waters from the clouds, and as these waters pass downward through the canal-pores or openings, the warm atmospheric air fills the places thus emptied.

All waters falling upon a field in the form of rain or snow, belong, of right, to that field, and ought never to be allowed to pass over it, but downward and through it. Water running over the surface of the ground is always carrying away the very ingredients most needed, and in the best form for the nourishment of plants.

Retentive soils are natural revenue officers. They levy a tax upon everything coming within their reach. They take from all decaying substances, when placed in contact with them, all odors, and utilize them for plant food. And so, too, when the rains descend, freighted with the richest of fertilizing matter taken from the atmosphere; if they are compelled to pass through the soil, the tax is levied with a vengeance, and no drop of water is allowed to pass untaxed. No false returns can here be made, and no evasions of the law. Soils have no party affinities, but affinities for all. They were appointed to the office of "revenue collector" under a "civil service system" that shows no favoritism, and that is much older than General Grant.

Fields drained to a depth of three and a half or four feet, at distances varying from thirty to forty feet, will have, in two or three years after draining, a capacity for taking nearly all waters falling in rain or snow.

But, before proceeding further, let me mention some of the most obvious results arising from draining. 1. It carries off stagnant water, and furnishes an escape for excessive rainfalls. 2. It prevents the ascent of water from below by capillary attraction. 3. Water passing downward through the soil opens the way for fresh air laden with oxygen, which is so essential to hasten the decomposition of minerals in the soil. 4. Soils, after draining, become more open and pliable, and are thus more easily worked. Stubborn clay soils are almost entirely changed. 5. Soils become warmer by taking off the water, and thus advance or hasten the growing crop, bringing about an earlier harvest, and, in effect, producing a change of climate. 6. It enables the farmer in a wet season, both for spring and fall seeding, to put in an earlier crop. 7. It increases the depth of cultivated soil. 8. In wet soils, wood ashes, bones, and many other ingredients that might act as fertilizers, lie dormant, and are lost. Taking off this excessive moisture, these elements are changed, and rendered effective.

These are some of the many benefits derived from a system of thorough draining. In this discussion, thus far, we have spoken only of its effects upon the growing of crops. What shall we say, then, concerning its effects upon climate, the health and happiness of our families, and the entire country?

The depth to which drains shall be laid, the distances apart, the kind of tile to be used, and the manner of laying, are questions pretty generally settled by those who have for years been experimenting upon this work. Many years since, Mr. John Johnson, of western New York, an old Scotch wheat grower, laid some fifty miles of tile drain in the course of thirty years. He, therefore, speaks from the record. He may be called the pioneer of tile draining in America. Mr. George E. Waring, of Newport, Rhode Island, who drained "Central Park," New York, and a few others who have been solving this problem, and verifying its proofs, have settled these questions beyond dispute.

Some two or three years since, the draining mania seized me. A portion of my farm had been developed to the fullest of my powers to know and do. Deep plowing, thorough culture, liberal manuring with phosphates, bone-dust, ashes, plaster, salt, and barn-yard fertilizers had been used. And yet, with all these, the results obtained were not satisfactory; that is to say, the yield in crops did not come up to the point I desired, and what I thought I ought reasonably to expect. Then, again, there was not that fixedness or certainty about them that I thought there ought to be, as regards both quality and quantity. It is true, my farm produced more than my neighbor's, and I made comparative success.

Being a novice in farming, I may have had too high an ideal. And, yet, I cannot but believe that, when the natural necessary and possible conditions are complied with, no acre of ground should be planted or sowed that will not yield at least a hundred bushels of shelled corn, two hundred and fifty bushels of potatoes, sixty bushels of oats, thirty bushels of wheat, and so on. I need not say to you that I have not, as yet, reached this point; but I am striving for it, and think it is within my reach. With some of these crops, I have reached the desired point; but there is no uniformity, taking one year with another. There is too much uncertainty about it.

And here let me say, in passing, that I place but very little value upon any experiment with fertilizers, plowing, or, indeed, of any kind, so far as soils are concerned, when made upon undrained land. It is absolutely impossible, in the nature of things, to make an experiment that shall be sufficient to settle any of these questions upon undrained soils. Every man who puts seeds into the ground, starts in with the "if it is not too wet," or, "if it is not too dry, I shall have a good crop as the reward of my labor, for I have plowed deep, pulverized well, manured bountifully, seeded early and abundantly." And what more could he have done? I reply, in the language of Scripture: "Woe unto you, Scribes, Pharisees, hypocrites, for ye pay tithes of mint, anis, and cummin, and have omitted the weightier matters of the law, judgment, mercy, and faith; these ought ye have done, and not to leave the other undone." I need not pharaphrase this scriptural quotation before this intelligent body. Its application is quite apparent.

In all human affairs there is always uncertainties, and it is the part of wisdom to reduce these to their minimum point. Some of them cannot be remedied. Professor Jevons, in a recent article to a scientific magazine, has attempted to show, and with considerable plausibility, that commercial crises are caused by spots on the sun. Now, this is a contingency for which no other provision can be made than a sort of Egyptian seven years of plenty and saving, though, I believe, Professor Jevons' periodic crises is is about ten and a half years.

Among the remedial agents clearly indicated to me for the lessening of these contingencies is draining. I have carefully read and studied what works I could obtain upon this subject. A little work, by G. E. Waring, entitled "Draining for Profit," is definite and specific. He speaks from what he knows, as gathered from years of experience. His book was written some twelve years since. I wrote him not long ago, asking him whether the years that had elapsed since the writing of the book had changed his views to any extent, so as to modify, in any degree, any of the statements set forth. His reply, in substance, was: "The intervening years have only the more fully confirmed what was said."

Let us, for a moment, see the practical working out of some of these obvious results from draining.

By lowering the water-table line three and a half to four feet, we not only increase the capacity of the soil for manures and fertilizers, but facilitate the penetration of roots in time of drought, thus reducing the contingency of failure of crops in excessive dry seasons. The same contingency is provided for in wet seasons, by opening a way of escape for water.

But one of the greatest of results is that arising from the increased temperature of the soil, caused by the interpenetration of the soil from the surrounding atmosphere, and from currents of air passing up and through the tiles, when not filled with water. This constant circulation of air through the soil, carries warmth and fertilizing gases. It also increases and keeps open the innumerable minute pores.

Crops grown on drained land, grow much more rapidly on account of increased temperature, and therefore bring about earlier harvest, and earlier fall seeding. Here, again, we lessen the contingency of failure of crops. An early harvest is always desirable.

It is not, I trust, necessary to multiply illustrations. They must be apparent to all close thinkers. It must, also, be equally apparent, that if we use all the means at our hands for the perfecting of our lands and the growing of crops, the most of the uncertainties connected with farming may be provided for.

Why, then, do not more farmers underdrain? I am told by physicians that there are times in the history of disease when heroic treatment becomes necessary, and that it is often the last resort. It is the dose of Croton oil, or the surgeon's knife. In its results, it brings speedy relief or equally speedy death. Draining is the heroic treatment in farming; but to be heroic is to be plucky. It is to know what is best to do, and then have courage to do it.

But, " will it pay," is the everlasting question that comes to this universal experimenting Yankee nation. Of course it will pay. But in this, as in many other things, we must learn " to labor and to wait."

But let us see what Mr. Johnson, the old pioneer drainer, says upon this point. " Tile draining will pay for itself in two years." " On drained lands one half less manures are needed for a maximum crop." " I never made money until after I drained." "And so convinced am I of the benefits accruing from it, that I should not hesitate to borrow money with which to drain."

There can be hardly a question about its paying from eight to ten per cent. interest on the investment. Let us suppose that to drain an acre, it costs the highest figures set—sixty dollars. The increased crop will more than pay the interest on this. An increase of only ten bushels of corn at fifty cents per bushel, pays eight and one third per cent. Think you that this small increase is not probable? Every single test, so far as we have any record, not only confirms this, but in a large majority of cases increases this amount. The first year does not fully develop the benefits. The second year gives better than the first, and the third year usually gives the maximum results from which no changes occur. This may be readily seen when we consider the fact that time is an important element in the matter; for it is a slow process, the opening of pores from below, over an extended space of thirty feet in width. The first year may not in some soils drop the water-table line in the central part of the space between the drains, more than half the desired distance, but it increases in a sort of geometrical ratio.

Besides, draining is not only a permanent but a safe investment. If an interest of eight or nine per cent. can be obtained the first year, and this is increased somewhat for two years to come, and there remains for all coming years, I ask where is there a better place to invest money?

No danger from breaking banks, failing insurance companies, or the dabblers of visionary political currency-question speculators. There is no suspension in this. It is resumption continuously in the best of coin. Your dollar invested may not have as many grains of silver in it as the trade dollar, but it will have far more grains of common sense in it.

Why then may not capital seek an investment here? Its permanency, safety, and large interest accruing, ought to be the highest and best inducement. What magnificent results would be obtained! Capital that is now seeking, and oftentimes finding precarious investments, would be employed at home. Increased crops, less expenditure of money for fertilizers, and the facility in working soils greatly increased. Add to this, increased healthfulness, and a greatly improved climate, and you have, in brief, some of the valuable result that would flow from a thorough draining of our farms. But these are not all, by far. How this would tone up and invigorate our sleepy, plodding farmers! The uniformity of crops, and greater ease of working soils, could not fail to put new life into the toilers. Men would be better contented with their vocation. They would not farm to live, but live to farm—because it would be a pleasure—and last, but not least, it would pay.

FOREIGN AND AMERICAN AGRICULTURE.

By Dr. JOHN P. EDGE, *Member from Chester.*

MR. PRESIDENT: "Foreign and American Agriculture" is much too large a subject for an essay, and would better fit a volume. Its proper discussion, would require much wider opportunities for observation and study than mine have been, and while, therefore, I might apply to my use the vast resources in agricultural reports, consular reports, agricultural journals, &c., &c., and alarm my hearers with the array of facts and figures developed. I shall only use the occasion in discussing a few points, not confining myself to the text, in contrast rather than comparison, as the methods and results are so different there and here, as almost to forbid the latter.

As compared with the farmers in Europe, we are so young and vigorous, and our areas are so wide, that our people have not the same incentive to the close and severe tillage practiced over there, and would not tolerate their slow and primative methods. The observer will soon learn, however, that while in these respects we are far in advance of them, yet, in results, they excel us in almost everything.

Every foot of soil capable of production, is, from the severe demands of their dense populations of consumers, and the abundance of cheap labor, made to contribute in some form to the general supply. Even the rocky slopes of the mountains are, in some sections, supplied with soil from the valleys to swell the result. Thus, are the vine-clad hills of the Rhine, in which are grown the fruit that yields the finest German wines, terraced, and made productive from base to summit by earth carried up their steep sides in baskets, mainly by the labor of women, who, as well, cultivate and carry the fruit down when harvested.

We can form no correct ideas of their social and industrial condition, or of the stimulants to industry, frugal habits, and close economy among the masses who are not rich. This necessity is the more remarkable, when we reflect that a given sum of money represents a much wider usefulness in supplying the family wants than with us. An extreme illustration will bring out this idea. In the Brussels lace factories, a pound of dressed flax, costing less than twenty cents, is liable, by the application of days and weeks, it may be years, of patient labor, to be made represent a value of from $500 to $1,500. This marvelous increased value is nearly all represented in the consumption, by the operative, of the product of agriculture, at their low rates. The same labor here would be represented by a much larger consumption and cost.

You may find in our cities to-day fabrics which, if purchased by weight, would cover the above figures.

I will remark, that both in Great Britian and on the continent, they understand the true economy of stock raising and feeding much better than we. In their large families of pure breed cattle, which have existed, not only without degeneracy, but with progressive improvement, for many generations; whether we view the hardy and heavy set hornless breeds of Scotland and the north of England, that have so recently carried the highest prizes at the Paris Exposition; or the sleek Devons; or the collosal Short-Horns; the Hollands; the Dutch Belted; the graceful and beautiful duns of Switzerland; or the coarse and heavy horned white herds of Italy; in all we find the benefits, in a general sense of breeding to family strains. It is equally seen in the countless herds of sheep in England and elsewhere; in their horses, also, showing such marked family traits, that one cannot mistake them.

There may be seen in Liverpool one business firm that employs eighteen hundred horses for heavy draft; and if you can tell any one horse from another, you cannot fail to know that these are all Clydesdales. So in the distinct families of sheep, of which there are some twelve or more in the British Isles, I suppose that an intelligent farmer there would know at sight any member of one of these families whenever seen. Public opinion and custom, the result of long series of observations, and the conservative character of the people, compel respect for family integrity even in the rearing of domestic animals. It is a part of that system by which the several counties and larger political divisions are preserved as distinct and separate peoples in language, customs, &c. A Devonshire man would be about as slow to stint his favorite cow to an Angus bull as he would to wed his daughter to a Highland laddie, or to a far-down Irishman. And the fortunate owner of a premium Angus cow would feel that he degraded her by contact with a Jersey bull in the same sense, as in marrying his favorite daughter to a Yorkshire spinner he would destroy the family character.

By long and careful courses, and especially by practicing the theory of "the survival of the fittest," they have established distinct and well defined breeds that are closely kept pure. We, on the contrary, *having* no well defined families in anything, infuse promiscuously into our "native common stock" the blood of improved foreign breeds, the effect after the first cross too often being backward and improfitable. The mixture is generally too abrupt for a happy result; and we see, therefore, all over the country a race of mongrels as disreputable to their ancestors as are the villainous curs that infest us to the pure cooly Newfoundland, or setter from which they spring.

Our careless practices in this promiscuous crossing has the further serious fault; that under a well established law in physiology the pure bred animal loses, to some extent, its power to transmit its qualities after contact with other breeds. That the rearing of *improved* stock is the true economy, and gives the best results, has been so fully proven before this Board, and elsewhere, as to be no longer a question. My limited chance of judging forces the conclusion that if the same attention was paid here as abroad in these matters, our breeders would greatly excel them, as they have the means to do so in abundant forage and cheap grain, and a better climate. In the few well kept herds of imported breeds in Pennsylvania better cattle can be seen than in the Queen's dairy and meadows at Windsor Castle, or on the adjoining Prince Albert model farm, in which the consort's interest was so much centered, and where all their animals are represented by their finest members.

This fact is shown in the exportation of Short-Horns from this country to England at the fabulous prices recently paid for members of the Dutchess herds, and some other of the well kept families, unfortunately so scarce with us.

We have better Berkshires and Yorkshires also where they are properly cared for than I saw in England.

Here the comparison must change. We have no sheep to compete with the foreign, as was well shown at the Centennial Exhibition, and may be seen through their sheep-growing districts.

The dog nuisance comes in to destroy, for our herdsmen, the best end of live stock profits. Until we can have enforced better protective laws against this disturbing element, we must continue to pay heavy tribute by importing our finest wools and woolen fabrics, and starve out enterprise at home. That sense of security and content, so essential to this timid and nervous animal, they always have in the presence of a herder abroad, while our flocks are generally left to the chances of the range. Another point in which they excel us is in the fattening of the animals for market. The cost of raising the young there is such that it is ruinous to kill any but those thoroughly fattened. The system of soiling, as you know, is very largely practiced, and in most districts the neat animal spends his entire life almost in the stall or corral, with just enough exercise to develop muscle and preserve health. The number of cattle and sheep raised and fed per acre is greatly in excess of the average with us; and, in addition to the other products of this soiling system, it supplies the farmer with an amount of manure, which has made the greater part of England and the continent a garden, in fertility, for generations.

Another advantage is the superior eating quality of the meats. It is always tender, juicy, well mixed, fine in the grain, and, I may add, well cooked.

These remarks are not intended to apply to the mule steaks and horse roasts of France and Germany.

The rapid increase in population is compelling an increased application of the soil to root and fruit crops, and a consequently increased demand on us for animal food. This demand must secure better attention to the raising and fattening of first-class animals. With them only we can best compete in the present markets, and if we can undersell them, and keep up the supply, it must result in the disuse of stock raising on the high-priced lands of Europe, and its transfer largely to us. Self-interest and foresight should compel our farmers to a more careful and intelligent breeding of all kinds of domestic animals, with assured profits.

As a suggestion of the support and encouragement afforded to the best results of breeding in Great Britain—and the application will hold to all other branches of the farmers' work—I need only refer you to the list of premiums awarded by the Royal Agricultural Society, at its last meeting, at Dover, and the offer they are making for the approaching fair at Kilborn, London. The list of the latter sums up to respectable figures of £13,000, or $62,000, with local edition of several thousands more. During their continuance, each day there is an exhibition of the practical operation of some industrial department of agriculture in progress; as for instance, an exhibition of the French, Scandinavian, and English systems of butter making, side by side; or of the different processes for keeping meats; or of the different styles of wagons for farmers, &c., &c.

We, in a State or county fair, can hardly make comparison with the Royal Society of England.

But, let us take a county society there, and the county society in Pennsylvania offering the largest premiums, and also the State Society of Pennsylvania for a short comparison. Selecting the Short-Horns to represent beef-producing qualities, the premiums offered will compare as follows:

	Best.	Second.	Third.
BULLS OVER THREE YEARS OLD.			
Yorkshire Society, England,	$140	$55	$27
Chester county, Pennsylvania,	10	5	
Pennsylvania State Agricultural Society,	25*	20*	15*
SHORT-HORN COWS THREE YEARS OLD.			
Yorkshire Society, England,	140	55	27
Chester county, Pennsylvania,	10	5	
Pennsylvania State Society,	20*	15*	10*
AYSHIRE BULLS THREE YEARS OLD.			
Highland Agricultural Society, Scotland,	112	55	Medal.
Chester county,	10	5	
Pennsylvania State Agricultural Society,	25*	20*	15*
AYSHIRE COWS THREE YEARS OLD.			
Highland Agricultural Society, Scotland,	140	55	27
Chester County Agricultural Society, Pennsylvania,	10	5	
Pennsylvania State Agricultural Society,	20*	15*	10*
SHORT-HORNED HEIFERS UNDER ONE YEAR.			
Yorkshire,	82	55	27
Chester county,	1½	1	
Pennsylvania State Agricultural Society,	20*	15*	10*
DRAUGHT STALLIONS.			
Yorkshire,	165	82	Medal.
Chester County Society,	8	4	
Pennsylvania State Society,	20*	15*	10*

* Very much increased at the last exhibition.

France is a marked instance of the benefit of centralizing pursuits that depend on each other, and cheapen the cost of production, leave a wide margin for profits.

While all nations are more or less dependent on each other, the one is more prosperous and free that is self sustaining. France came so near feeding her vast population by her improved and forced system of farming, beside producing wine to use as the common drink, that she only asks us for $56,000,000 annually in the products of the soil to free the margin, and pay us dollar for dollar in fabrics.

While Great Britian shows that she has got so far beyond the possibility of feeding her millions, she that takes products of our soil some $400,000,000 annually, and returns us only $98,000,000 in fabrics, and the balance in cash. The widest difference between the foreign and American farmer is in the *methods* of tillage.

That is a very poor township with us which cannot display among its farms one or more full sets of labor saving appliances, of the most approved pattern. *We* depend on machinery to perfect and harvest our crops. With a span of horses and one man, our average farmers of one hundred acres will do all the year's work, except threshing and part of the harvest.

He has ample barns; his buildings are centrally located to cover all the advantages of water, drainage, &c.; his house, if not pretentious, has the appearance of comfort and solidity. Everything about gives you the impression that the occupant lives at *home*.

In Great Britian and on the continent it is different. All the surroundings speak of age and pinch. The farmer is a peasant; his home a cottage, generally straw or tile covered; low, damp, and cave like.

You see no large wagon houses filled with mowers and reapers. His barn is a shed, often connecting with the dwelling, and under the same roof; his harvest in stacks; his domestic animals a part of his family, the stable often serving as a sleeping apartment for both.

Everything is primative, and the entire living suggests the renter, who is, in reality, *loaded down* with rents, and taxes, and tithes, until after the landlord, the priest, and the State, and the municipality are satisfied, often has less than one fifth of his earnings for *his* share.

Then, again, the land is so divided up that the farms assigned to these tenantry are generally ranging from two acres to fifty, from which he must maintain life's warfare. On the continent, the contrast is still more marked; and while in the German and French speaking nations you see everywhere the evidence of a highly successful husbandry, you are in wonder that such results follow so crude and unskillful practices. The families are clustered in villages, and so are the harvested crops carried from a long distance, often on the backs or heads of women. It is a curious and revolting sight, as you rush along the iron road, to see in almost every field women with one or two cows, or it may be with a cow and donkey harnessed to a rude clumsy plow, that one of us would not know what to do with, turning the deep, rich mold, and doing work that our crack plowman could not excel. In an adjoining plot, you may see a half dozen women and girls, bonnetless, sunburned, broad shouldered, big footed, and, I am sorry to add, seldom good looking, with great clumsy hoes breaking up the soil, and doing at once the work of plow and harrow. Their strength and will are good, and it is surprising the amount of work they do. The men are seldom seen at this kind of thing. They run the railroads, the army, the schools, the professions, &c., they are presuming and bigoted. The women, as seen in the market or on the farm, are stolid, subdued, untidy, unmannered, and slavish looking. It is an unnatural sight to see them with great loads of hay or grain on their backs, or of brushwood from the distant forests, while a big stout hans stands at each road crossing in military suit, with gun at present arms as you pass. You feel like exploding the whole thing, if you had the power, and only get the better of your indignation when you cross the border of republican Switzerland, and see that women is recognized as a citizen and an equal.

In Switzerland there appears to be a community of interest between the sexes seen nowhere else in Europe—a proper morality and a more abiding family. The man and wife are seen in the fields together, or if one is absent it is the latter. Here, as nowhere else in Europe, is the struggle for subsistence severe and pinched; but you witness no evidence of discontent. The long snow-bound winters, the short and uncertain seasons for cropping on the mountain slopes and in the mountain shaded valleys, the narrow range of crops, and the difficulty of wintering domestic animals, all bring into the task the native thrift and self-reliance that has maintained this little republic, in the heart of monarchies.

The central government of Berne, and that of many of the cantons or states, provide, through agricultural bureaus, effective and intelligent helps to the farmers, and really preside over supplying seeds, tools and other wants, as required to develop their resources, and aid the weak. Nowhere is to be seen more beautiful and well-bred cattle, than on her mountain slopes. With the beauty in color of the solid Jerseys, they show a uniformity of character almost equal to the wild races, and a vigor and size and fattening quality that compels attention. The product of the dairy, while never gilt-edged from the kind of food used, is rich, and good, and abundant. A visit to the morning markets, however, should be made after breakfast, as the aroma of the provincial cheese is not appetizing. Its remarkable abundance, its odor and venerable look, suggests that the same stock had been on the market for years. The growing of fine wools, flax, and silk, is a large part of their care, and on the Italian side of the Alps, the vine, hemp, and rice are important items; but they are compelled to draw largely on France and Italy for supplies. The abundance and value of the timber is one of the most striking features of the Alps, when we know how dense the population, and that they live in wooden houses, and used wood largely for fuel, during their long and vigorous winters. This is the result of government protection, and the regulation of the consumption by laws. No one can cut away timber without its consent.

Nothing impresses the traveler more in any part of Europe than the forestry. In all states strict forestry law exist, and are enforced. The effect on the landscape is charming, and the benefit to the land owner can only be guessed at. The long vistas of trees skirting the highways, and around and through the farms, intermingled with fruit-laden vines, the long ranges of forests and of valuable trees, show the absence of that vandal spirit which with us is so rapidly destroying our timber, without any system to afford a supply for the future. In this we can get a valuable lesson from over the water. Vast sums are spent by the governments there for the planting and protection of young trees, for the triple purpose of health, beauty, and utility, and which must bring to the owners of the soil, there as it would here, large returns for the labor and outlay.

In the United States we grow upwards of forty bushels of cereals per capita of our population. A very large per cent. of this is converted into meat, spirits, &c. In Europe they grow only seventeen bushels per capita, not having our great corn yield in the account, and showing that a large margin has to be filled from our supplies. Our corn crop for 1878 is estimated at 1,343,000,000 bushels—almost equal to the entire cereals of the great empire of Russia, nearly double that of Germany, and double that of France.

Our wheat crop for 1878, estimated at 365,000,000 bushels, is more than half the entire cereals of Austria and Hungary. If our average yield per acre were made to equal this, the figures would be greatly swelled, but we do not need to go there to learn the economy of making one acre produce what is too often assigned to two or more. They show us another important lesson in the rapid rotation of crops. It is very common for them to realize two and three cultivated crops per season. The yield of each being very heavy, the aggregate of production must be enormous.

There are in this way devoted to market, farming, and gardening alone, the large area of one and a quarter millions of acres in Europe, and speaking of Europe, I include twenty-five States, which make accurate census returns through their departments of agriculture.

In Germany, more acres are devoted to raising the beets for sugar than in the United States for growing the sugar cane, but alas, only half as many as we devote to tobacco. If, therefore, only one half of this latter area was applied successfully to the growing of sugar beets, we could shut in the $100,000,000 paid for imported sugar, to make up our deficit. This import of sugar is the result of the toil of slaves mainly, for which we pay the Cubans in cash. The fact that both Germany and France grow more sugar from the beet than is required for home use, of a quality superior to that we get from the cane, is a suggestive lesson to us, that we, if in possession of the skill and patience, could check this drain on our national pocket, and not only exclude the foreign product, but leave us a surplus for export. As a home product, it would do much to extend the limit of the bond of union that exists in mutual exchange. There the present large production was encouraged and established by aid of the government, and with like assistance in developing the best localities and methods, sugar growing would with us soon become self-sustaining, and would employ many thousands who are now in enforced idleness and charges on the State, and who would be better in every respect earning even the lowest wages than as paupers. In this view alone it must become profitable.

The same may be said of the fruit of the vine, the fiber plants, and the silk culture. I have on another occasion referred to the two latter, as bearing on the industry and happiness of our people. Having since had an extended chance to witness the immense influence they have in the employment of whole communities of millions, who subsist mainly from their culture, I am more than ever impressed with the policy and duty of our government aiding in the development of these and kindred pursuits, as the best solution of many of the troubles that environ us.

I must not close this desultory paper, without a word of encouragement to that class of our farmers who so much delight to see a bountiful crop of weeds. They have plenty of friends and sympathizers abroad. On the shores of the beautiful 'Clyde, where the rye, grass, potatoes, and other crops are the most abundant, you may see thousands of acres where it is difficult to tell whether the crop is wild mustard, or oats, or whatsoever. And in the densely peopled States of Flemish Prussia, it is often hard to decide if the wild poppy or the barley has it. In many districts in Belgium, little care seemed to be used to control an interesting admixture of flowering weeds with the grass and grain. Let the sluggard take courage and consolation.

SUNNY AND SHADY SIDES OF FARM LIFE.

By GEORGE W. HOOD, *Member from Indiana.*

The subject assigned me by your committee is very comprehensive in its scope, and if fully treated, multitudinous in its details; but in the brief space of time which I shall occupy, I shall not attempt detail, but shall endeavor to give some few suggestive points in order to show as fully as I can the two phases of farm life as indicated by my subject, viz: the sunny or bright side, and the shady or dark side.

The poet has said that—

"When nature her great master-piece designed,
She formed her last, best work—the human mind.
With eye intent on all the mazy plan,
She formed of various parts the various man."

And thus at the threshold we meet this varied humanity, which, though alike in many particulars, yet in all respects adapting itself to the conditions of daily life in different form and manner.

The adaptation of mind to matter varies quite as much in form as the various forms of matter differ among themselves, and hence that which to one individual is bright or sunny to another is dark or shady, and that which is dark or shady to one to another is bright or sunny.

Then again it frequently happens that that which is bright or sunny to an individual at a certain time of life and under certain circumstances may to the same individual at another time and under other circumstances be dark or shady. Or like the individual of whom Horace writes, who, when amid the din and bustle of city life, longed to be transported to some far distant forest, where he could hear nothing but the music of the birds and the murmuring of the waterbrooks; and when it became his lot to be thus situated for a time in the lonely forest, longed to be back again amidst the throng and confusion of the city, where the din and bustle which once grated upon his ear would now be sweetest music.

One farmer may feel the sunlight of joy and content beaming in upon him as he goes out into the forest to fell the trees, to prepare the way for the plowman and the sower, whilst another may find in the same work deep shades of darkness penetrating his heart.

One farmer may be reveling in the noonday sun of delight and pleasure as he puts his hand to the plow and courses his round, or as he goes forth to harvest the crop, whilst another can see no beauty in these things.

Yet whilst our diversity of adapting and enjoying are as varied as our various humanity, there are some phases of farm life which to all must alike be bright or sunny, and other phases which to all alike must be dark or shady. The occupation of the farmer naturally affords the opportunity of enjoying more of the sunlight of life than any other occupation. As he goes out over nature's green sward to his daily toil, his eye cannot fail to catch the charming scenes of hill and vale, stretching away beyond the confines of his own boundary, and looming up in the dim distance to the blue horizon of the great arch of heaven. His ear cannot fail to be charmed by the voice of the birds as they warble their morning songs by the way, and at eventide unite in anthems of praise to the creator of the universe.

His soul cannot fail to be stirred to life's highest enjoyment by the sweet odors of flower and wood, which fill his every breath, and with which the whole universe seems to be freighted. *Life-giving*, *health-restoring*, *soul-invigorating* atmosphere surrounding him constantly, and of nature's purity he need but open wide his mouth and be filled.

Surely the enjoyment of nature's bounty *alone* is a sunny scene of life. But this is not all. Whilst enjoying the bounties of nature in their freshness and purity, he is more free from care and anxiety than any other man. The banker may worry about his dividends and bonds. The lawyer may burn his midnight oil in preparing his brief. The doctor spend sleepless nights at the bedside of his patients. The politician lie awake all night meditating about affairs of state. The mariner goes down to sea dreading the midnight storm; whilst the farmer returns from his daily toil to his family, enjoys the sweets of home in peace and contentment. Whilst wrapt in the embrace of refreshing slumber, free from disturbing care, the seed which he has planted, moistened by the dews of heaven, germinates amid the darkness of the night as well as under the power of the noonday sun, springs and grows up, he knoweth not how, for the earth bringeth forth fruit of herself, first the blade, then the ear, after that the full corn in the ear.

Then again, from the earliest days until the present time, pastoral or farm life has been rated among the most noble and worthy of lives. The coming of Christ was first made known to the shepherds on the plain, and the prophecies of the Gospel state that the better life shall be a rural one. "When men shall beat their swords into plowshares and their spears into pruning hooks, and nations shall not learn war any more." And thus we find that throughout nature and revelation, the occupation of the farmer is held up as a type of "the true," "the beautiful," and "the good," and if so, *sunny* and *bright* should it always be; and the farmer who does not feel and realize the sweet influences which surround him as he engages in his work, must indeed fail to enjoy that which the great Creator, in his *wisdom*, intended he should enjoy.

Aside from this, his life is and always can be the most independent of lives. If the earth, in response to his toil, brings forth fruits in abundance, he has his first choice; his garners are generally full; his larder at most times well supplied. When seasons of dearth and scarcity come, and men in other employments go forth to secure the wonted provisions necessary to sustain life, he can sit quietly at home, with no need to care for the world of mankind outside.

But what shall I say as to the shady or dark side of this life? Has it a dark side at all? Can it be that a life so full of scenes elevating and ennobling in themselves, has *anything* in it to detract from the full enjoyment of its varied pleasures? Yes! Above the horizon rises a cloud, at first scarcely perceptible, but as we scan it and weigh it, it assumes larger proportions until it becomes the one *great* shadow upon the life of the American farmer. This is the isolation, the solitude of farm life. There seems to be a general disposition among American men and women in shun agricultural pursuits. We see young men everywhere pushing into trade, into mechanical pursuits, into the learned professions, into insignificant clerkships, into salaried positions of every sort that will take them into towns and support them there. It is impossible to drive poor people from the city with the threat of starvation, or to coax them away with the promise of better pay and cheaper fare. They prefer to stay in the city and starve, and sicken, and sink. Young women resort to the shops and factories, rather than take service in the farmer's house and family. Farmers' daughters fly the farm at the first opportunity. The towns grow larger all the time, and in New England, at least, the farms are becoming wider and longer, and the farming population is diminished in numbers, and in some localities degraded in quality and character. It all proves this, that isolated life is not the natural condition of man. The social life of the village and the city has an intense fascination to the lonely dweller on the farm. Especially is this the case with the young. Young American boys and girls desire to meet life, and be among the multitude, and when they feel life to be narrow in its opportunities and rewards, they naturally desire to be where they can see rushing trains and passing steamers, and receive the daily newspaper damp with the ink of the press from the hands of the crying newsboy on the crowded street. They *will* fly to the towns for the social food and stimulus for which they have starved. It is in colonies that all ought to settle, and in villages rather than in isolated farms.

The social assembly, the lecture, the church meeting, and the public amusement should always be in reach. If the social life of the farmer were richer, his life would be by that measure the more attractive and bright. Observation verifies to us the saying that the "old man" who rides to market and the post office and mingles more or less in business with the world, gets along tolerably well; but it is the stayers at home who suffer. Instead of getting wiser and better as they grow older, they lose all the graces of life in unmeaning drudgery, and instead of ripening in mind and heart, they simply dry up or decay.

It is not true that men shun the farm because they are lazy. The American is not a lazy man *anywhere*, but he *is* social, and he will fly from a life that is *not* social to one that *is*. If our agricultural population is to become larger and better, isolation must be shunned, and the whole policy of settlement must be controlled or modified as it now is in Germany by social considerations. True it is, also, that clouds of less magnitude hang over the life of the farmer. The supply of vegetables and fruits which he had gathered in the melancholy days of the fall season and which he had stored away for winter's use, may, notwithstanding all his care, receive a visit from Jack Frost, and fall a victim to his destroying power. During the hours of a night, whilst he slumbers, the work of months may come to naught. Grain in the ground, not protected by the snow, may freeze and perish. Disease may come among his flocks and herds, and as a fell destroyer cut them all down. Storms may come upon his forests and level the trees to the ground, or upon his fields when the grain is ready for the sickle, and destroy the entire crop. Yet it must be remembered, that these misfortunes are the exceptions and not the rule; and should these shadows fall, they but flit across his pathway and are eclipsed, if not entirely dispelled, by the bright and sunny scenes which surround him. There is nothing on the shady side of the farmer's which need discourage him. With the great advancements already made in the science of agriculture and the improvements brought out for facilitating farm labor, there is no reason why this most ancient of all human industries should not be raised to that pitch of power and influence to which it is partly entitled.

The world is ever moving on, and no industry as valuable to the interests of humanity as farming, can afford to lag behind.

There are *indeed* but few shadows which intelligence, social culture, and energy cannot dispel.

HOW WE MAY ELEVATE THE STANDARD OF AGRICULTURE.

By Hon. C. C. MUSSELMAN, *Member from Somerset.*

"*To elevate the standard of agriculture we must elevate the farmer.*"

It is a remarkable fact that many people, even farmers themselves, think that education is of very little importance to the agriculturist. It is true, there is no vocation or profession that can be followed with less education; but there is none, high or low, that can make use of more than the business of farming. The body may put forth its utmost strength, but it is only when physical power is directed by the best intelligence that it accomplishes its happiest results. Men of science and acute observation are now continually throwing out, through a teaming press, the most valuable knowledge upon every subject, so that "he who runs may read." While many of the learned professions come in contact with comparatively few of the arts and sciences, the farmer who follows his vocation meets, perhaps, often with all the natural sciences, practically, in a single day. He can scarcely do a day's work without practically knowing all the mechanical powers in natural philosophy

He comes in contact daily with natural history, botany, mineralogy, geology, animal and vegetable physiology. Chemistry strikes him in the face where ever he goes, especially when he enters his stables and barn-yard. This is a very profound, yet important, study, and every farmer should know at least something of the elements of agricultural chemistry. It is thought by many that astronomy has very little to interest the farmer, excepting, perhaps, the study of the moon, and the signs in the almanac.

No class of men upon this mundane sphere have a better opportunity to study the wonders of nature than the tillers of the soil. Let us contemplate for a moment an intelligent farmer, with a commission of his high calling from God, "who created him in His own image," only a little lower than the angels, and commanded him to "replenish and subdue the earth, and have domain over the fishes of the sea, and the fowls of the air, and every living thing that moveth upon the earth," standing upon his own soil, (if it is only an acre,) with a commission form the highest authority, dating back to the garden of Eden, and a title that reaches down over four thousand miles, even to the center of the earth, and up to the very portals of heaven! What an opportunity this man has to cultivate his mind and body while he cultivates the soil, moving continually in the midst of a grand panorama of celestial and terrestrial objects. To him the sun pours down his glorious beams of light and life. Every ray is a dispatch from that gorgeous world of heat and light, speaking of its vast magnitude, its mighty attractive powers, the life and beauty it infuses, and all the rich instructions gleaned from this great source of heat and life. "The stars bring to him intelligence from the regions they inhabit, and each constellation affords him information of those who have gazed upon its beauties in centuries gone by. The comets come to him with their banners streaming back, telling by their inconceivable velocity of the immensity of space they have penetrated in the realms above. The moon pours down its floods of light. The clouds and lightning come over him, to tell the mission they have to perform. The thunder and winds rattle and roar, to whistle into his ears the story of their lives and labors. The earthquake moans to send a voice of instruction to him from below, while the volcano flashes up its great torch-light to read the earth's ancient history by." He finds instruction in the "cattle of a thousand hills," in the birds above him, and the fishes and insects beneath him. If I have overdrawn the picture, it was for the sake of elevating the standard of agriculture, in which every man, woman, and child is interested.

If there is one vocation more natural, more healthy, more independent, and more useful than another, it is that of farming. It was the first, and must be the last. Xenophen describes it as the most worthy employment of man, and the most suitable to his nature; the most ancient, the best suited to all ages and conditions of life; as the source of health, strength, plenty, riches, and a thousand sober delights and honest pleasures; as the mistress and school of sobriety, temperance, justice, and religion. But with all this, farming is unpopular, it is looked upon as a business of hard work and little pay. Everybody wants everybody else to stick to the farm, while that particular somebody goes to something else. The truth is, we are all interested in farming, and want everybody, excepting ourselves, to stick to it.

Much could be done to "elevate the standard of agriculture," by encouraging and making labor more respectable. Some think that labor has a degrading tendency, but nothing is further from the truth. It is a notorious fact that the distinction which most known and eminent characters have acquired, was through and by labor. Cæsar's necessities drove him to the field as a soldier, and it was the active and severe service he encountered that brought out the latent power of an immense intellect. Napoleon had to learn a trade for a livelihood, and it was through pressing circumstances into which his profession threw him, that matured and made manifest his ready genius and all-conquering energy. And I believe we would never have heard of Benjamin Franklin and Robert Fulton, had they not been poor boys. And so of the thousands of others along the whole line of great men who worked their way to renown.

The man who spends his time clearing up a farm, thereby making provision for man and the whole nation for ages to come, lives and dies almost unnoticed. His exalted patience, modesty, industry, and frugality, doing his duty to his family, serving his country, and honoring his God, is looked upon as degrading, and of little account. While the political trickster, who is sitting around the corners, waiting for something to turn up, who is all things to all men, and who, by his crafty machinations, can weedle the masses, secure to himself honor and profit, and is cheered! Right here we help to lower the standard of agriculture, by elevating idlers, spendthrifts, gamblers, petty-foggers, and demagogues to offices, while the honest, industrious, unassuming, economical farmer takes what is put in the rack for him. Is it any wonder that our young men are drifting from the farm into the already over-crowded professions, and into the cities and towns, to sit around the taverns, concocting mischief, while there is so little premium and respect for labor? Is it any wonder that we have hard times, when we elevate these idlers and spendthrifts to office, who never do anything for themselves, yet some of them would have us believe that they have an invention by which the government could supply us with money as abundantly as the miraculous manna, sent from Heaven to the children of Israel!

Farmers are the majority in peace and in war, yet how many offices of profit and honor are filled by them, (excepting a few insignificant county or township offices?) . Not one out of forty; yet they have enough men in their ranks capable of filling every office in the land, from the highest to the lowest. Inasmuch as dislike to labor, and the supposed unprofitableness of farming, is but the result of training, this training must be changed before agricultural pursuits will be properly appreciated. How little the world admires, and yet how heroic the resolution which prompts the young pioneer to penetrate the trackless forest, fell trees, erect a rude hut for himself and family, and then, acre by acre, clear off his farm in the wild woods, until he has a home of peace and plenty around. Oh, there is heroism and fortitude here, that puts to shame the famous march of Napoleon across the Alps. Any man can be courageous when he has thousands to back him, and do his fighting. Any man can be heroic and persevering for a time, under trying circumstances, but when the poor pioneer surmounts difficulties daily, and during a lifetime struggles with poverty, he displays heroism and manly fortitude, that excites the admiration of all who can appreciate such indomitable persistency. There is no employment so well calculated to purify the character, elevate the nature, enoble and expand the mind, as farming.

An agricultural and industrial college has always been my ideal of a high school, if properly conducted, provided it is possible to keep out of the old rut of mental discipline, at the expense of physical training. There appears to be something wrong with our educational training. To send a young man to a high school now, is to send him forever away from farming. We don't want less education, but we want more of it on the farm. By a course of study, the body often becomes enfeebled, if not entirely wrecked, without strength or energy to perform manual labor, or anything else. Unless a youth starts out with a good constitution, acquired by early training or inheritance, the chances are that he breaks down before he gets through with his collegiate course. Many of our best young men, instead of gravitating to the farm, where they could go into training, physically and mentally, drift out into the world with no particular object in view excepting an education, which is, generally, not complete until they have learned to revel in the fashionable use of tobacco, and other evils.

And to what are we educating and training our daughters? Let the whole nation stand up and answer. Are we educating them to become "helpmeets" and house-wives to the farmers? or are we educating them by a fashionable training, to become mere playthings, more ornamental than useful; to become pale, sickly house-plants; ephemeral butterflies, unable to digest the latest novel? Are they educated and trained to honor and respect the dignity of labor, to answer the noble design for which they were created, or is the order of heaven to be reversed? The violation of the laws of nature are inexorable, and we cannot escape the penalty. Woman in her true nature is the noblest work of God. Some one said, "to cultivate and develop the woman is to cultivate and develop the human race," and I will add to elevate the nation, and to elevate the nation is to "elevate the standard of agriculture."

Experimental farmers have done and are still doing wonders for the promotion of agriculture, and should be encouraged. Agricultural societies and fairs, if properly conducted, have always been a rallying point for the promotion of agriculture. They create a laudable emulation and rivalry, and snatch a spark of that spirit and enterprise so luminous in the track of other vocations that are pushing along at railroad speed. It is to be regretted that farmers, as a class, do so little to elevate themselves and their noble calling, seeming not to regard the important position they occupy, ever content to labor unrequited and unhonored, complaining not nor attempting to reverse the decree that fashion and folly have recorded to their prejudice. Is it not a reproach to us farmers if we make no attempt to establish our claim and prove that we are not the dull, unenlightened drudges we are represented to be, but to have the sense and energy to stand erect and battle manfully for that lofty position which is our rightful heritage? Let us show that we have more than material strength to toil with our working animals of the field.

When ancient Rome was compassed by conquering armies, and pressed to the verge of destruction, she summoned a plowman from his plow and clothed him with power. That plowman's word became the absolute law of the land. The conscript fathers bowed to his dictation, and proud patricians obeyed him without a question. The jeweled fingers of Rome's loftiest nobles were pointed, not with scorn but admiration at the sunburned farmer. If Cincinnatus, the farmer, by his wisdom and courage saved the Roman republic, the "rail-splitter" and the "tanner" saved ours.

Farming was the occupation of our first parents, to "dress and keep" the garden of Eden fresh from the hands of God. Shall this ancient, profitable, and honorable art stand still while other arts and sciences are pressing on to perfection? Shall the tillers of the soil follow wooden plows in the same furrows that were turned by their ancestors some hundred years ago, while the lightning bears our messages and an element not less mighty propels our cars upon the land and our ships upon the sea? No! The answer comes from our legislative halls, the bench, the bar, the press, the preacher's and physician's office, and the mechanic's workshop. Agriculture shall not stand still, but its standard shall be elevated and keep pace with its sister arts. All are willing to unite with the farmer to improve our means of living, our conveniences, comfort, and happiness.

ESSAYS AND DISCUSSIONS OF SUMMER MEETING.

SUGAR FROM CORN.

By F. L. Stewart, *of Westmoreland County.*

In presenting, at this time, a brief account of the new process of sugar manufacture, with which my name is associated, it will be necessary for me to allude particularly to the history of my re-searches in this line of work, inasmuch as all the facts of that sort which the general public cares to inquire about have been published; but it affords me great gratification, as a Pennsylvanian, to be able to say that my first systematic experiments directed to the extraction of sugar from the juice of the green stems of Indian corn were made in Philadelphia, where I went the Centennial year, and that the first fruits of that work were exhibited at the international exhibition a few days before it closed. I have responded to an invitation to exhibit the process now perfected in practical operation in the hall of the permanent exhibition, during the continuance of the approaching State Fair.

Briefly described, the process deals with saccharine juices, containing in their normal condition both cane and fruit sugars, the former largely preponderating.

I recognize three distinct classes of saccharine juices, viz:

First. Those like the tropical sugar cane and the beet, which, when their juices are mature, contain, in association with other substances, true crystallizable sugar only.

Second. Those like most fruits, such as the apple and the grape, which, whatever their composition otherwise, contain no true sugar, but only glucose, etc.

Third. Those like maize and sorghum, which have not heretofore been generally recognized as distinct, containing, in their best condition, both cane sugar and uncrystallizable sugar; but which, by reason of the defective modes of treatment heretofore resorted to, have proved practically uncrystallizable.

The difficulties are now entirely removed. It is now clearly shown that the juices of maize and of sorghum grown in the United States are richer in sugar of the true cane type than any other plants that can be grown in temperate latitudes; that nine tenths of their saccharine matter is such sugar, and that the impediments to crystallization are such as are peculiar to these plants.

Accordingly, I find that neither the processes adapted to the extraction of sugar from the southern cane, nor the much more elaborate or costly methods of the beet sugar manufacturies in Europe, are appropriate to the successful extraction of sugar from these plants, which, in this case, involves entirely new conditions, and requires radical changes in the mode of chemical treatment.

Entirely aside from its advantages as an antiseptic and a decolorizer, I have disovered a peculiar property in the dioxide of sulphur when employed upon these juices under certain conditions, which heretofore unknown and unused, now perfectly solves the problem of the separation and crystallization of the sugar. This is done *expeditiously*, *cheaply*, and *certainly*.

Practically, then, the value of these new sugar-producing plants may be concisely stated as follows:

First. The stems of Indian corn, in any of its many varieties, if taken at the proper stage of development, as well as those of the different varieties of sorghum, contain in great abundance a saccharine juice scarcely excelled in richness by the sugar cane of Louisiana. The sugar produced by this process, is true crystallized cane sugar. Maize sugar, it need hardly be said, is not the so-called and comparatively worthless "corn sugar," sometimes made from the starch of the ripened grain by a well-known chemical transformation, but it is a natural product of the immature plant. One hundred pounds of the stems of these plants, at the proper period of their growth, (when the grain is in the milk in the case of corn, and from shortly after the flowing period to perfect ripeness, in the case of sorghum,) contain about eighty-seven and a half parts of juice, and twelve and a half parts of woody fiber and insoluble substances. Twelve to fifteen per cent. of the juice is crystallized cane sugar, nearly all of which can be extracted.

Second. The impurities which hinder crystallization, as already said, are of a peculiar kind, and resist every other known mode of treatment, except that known in this process. The sugar so made is of as good a quality as that made from the southern cane or the beet, and is produced far more easily and cheaply.

Third. Like the sugar cane, and unlike the beet, these plants possess a saccharine quality of the juice which is little affected by the presence of nitrogenous substances in the soil. Hence they are adapted to a wide range of soils, notably those of the western prairies, where the beet is a failure.

Fourth. All varieties of Indian corn and sorghum yield this saccharine juice, and natural hybridization does not greatly affect its quality, and hence but little care, comparatively, is needed to prevent intermixture of varieties, although by careful selection richer varieties than those now existing will, no doubt, be produced.

Fifth. The immature corn plant only being used for this purpose, the sugar may be produced within a little over three months from the time of planting the seed. Hence all danger of frost may be avoided in our extreme Northern States, and generally the ground can be used for producing two crops in a season—a sugar crop, followed by turnips, etc. In these respects, as well as in many others, these plants have a great advantage over both the southern cane and the beet. Some of the most prolific varieties of sorghum require but a little longer period to mature their juice than Indian corn.

Sixth. The yield of sugar per acre from a single crop will range from two thousand to three thousand pounds, or equal to the average from the sugar cane and the beet at their best, *and at one half of the cost.* The total cost of production, including the cultivation of the ground, the harvesting of the crop, manufacture, interest on machinery employed, chemicals, royalty, etc., should not exceed two and a half to three cents per pound. The yield of sugar from each gallon of dense syrup produced will vary from nine to eleven pounds, averaging ten pounds. The yield per acre of ground planted may therefore be roughly estimated by the known capacity of the land in any given locality to produce crude sorghum syrup in former years. Two hundred gallons of dense sorghum syrup, crystallizing two thousand pounds, or a ton of sugar per acre, is an easily attainable yield on good soil, with good cultivation and proper crushing mills for expressing the juice. Of course where a crop of corn is planted for the sugar alone, it must be grown much more densely on the ground than when the ripened grain is the object. For example, common field corn sown in drills, so that the stalks will stand four to six inches apart—the rows three and a half feet apart—yields on soil of medium quality an average of two hundred and fifty pounds of trimmed stalks to each one hundred feet in length of the rows. Yielding to a properly constructed mill at least sixty-six per cent. (one hundred and sixty-five pounds) of juice of specific gravity, 1.057, of which ten per cent. (or sixteen and a half pounds) of sugar is by this process easily extracted, or at the rate of over a ton of sugar to the acre of ground. The comparison with this, the same kind of corn, planted in rows the same distance apart, but in hills averaging three feet apart, and three stems to the hill, so that the grain may be fully developed in the "roasting-ear" state, the yield of sugar will be only about one half of that in the former case or about one thousand pounds per acre.

Seventh. The hot summer climate of this portion of North America is unequaled for the growth of these plants, as the exhibits at the late International Exhibition at Philadelphia fully manifested, and the improved agricultural implements and methods now in use in maize culture will simplify and cheapen immeasurably its production.

Eighth. If a combined sugar and grain crop is desired, the largest-stemmed varieties of sweet corn should be grown. The grain may be cured by drying, when it is in the proper condition; but the ears of field corn may be removed before they harden, and fed to stock, either fresh or dried. There is scarcely any difference in the saccharine strength of the juice of "sweet" and field corn. Sorghum, however, yields more sugar than most varieties of sweet corn, on account of its much larger stems.

Ninth. Great advantage is afforded in the manufacture of the new sugars, from the circumstance that the period of cutting and working the crop into dense syrup occurs at a time when the season for out-door work is the most favorable, and when the days are long. No loss is likely to result from inclemency of the weather. Furthermore, the process of manufacture, when carried on by this system, may safely be arrested at a point where it may be completed during the winter, when labor is cheap.

Tenth. A large crop of blades and tops for fodder, equal to hay— th ripened seed of the cane—which, when crushed, is equal to oats, and the offal of the sugar factory for manure, are supplementary to the sugar crop, and very valuable.

Eleventh. By judicious treatment of the soil, returning to it, regularly, all that has been removed from it, except the saccharine product, a sugar crop is the least exhaustive of all crops that can be grown, and improvement of the land is easy and certain. New lands are equally adapted to it.

Twelfth. The force of the various natural advantages possessed by these plants in the United States will be found to be greatly augmented by the circumstance that the departures from the old processes of manufacture, now necessary to be adopted, are all in the direction of greater simplicity, cheapness, and ease of management in accomplishing the result—the reverse of what the more complex nature of these juices would seem to indicate. It will be found, for example, that the cost of the manufacture of corn or sorghum sugar in this country can easily be *reduced to less than one half the cost of the beet sugar manufactured in Europe, the carbonaceous process and the use of animal charcoal being entirely dispensed with, and the* *use of vacuum pan being made unnecessary*, and not even desirable, except in the case of the largest central factories.

In concluding this brief summary of the main facts of this subject, I cannot but express the surprise which I have felt during the whole course of these researches, that during the century which has elapsed since our birth as a nation, no adequate conception has been reached of the true value of one of the commonest products of our soil—our native Indian corn.

The value of the process itself, for the practical manufacture of sugar, independent of my own work, has been fully determined by the series of test experiments made with it, at the department of agriculture, last summer, under the direction of the commissioner, by Prof. Collins, and by intelligent farmers in the western country, who were furnished, by me, with the chemicals and necessary information. In no case has there been a single failure. The experiments already made with the process, at Washington, can fully demonstrate, in the language of the commissioner, "that there exists in these two plants a large amount of sugar, which may be readily obtained, and that the aggregate amount possible from this source would be practically unlimited;" and in the emphatic statement with which Prof. Collins completes his special report, "that the experiments have at least established the fact that there is no trouble in making sugar from corn and sorghum, and that the sugars obtained were in a most satisfactory condition, in every respect comparing most favorably with the best raw sugar of the market."

If the results already reached are accepted in their full significance, there can be no question that we are on the eve of a revolution in sugar manufacture, and of the rise of a new and permanent industry in this country.

SILK CULTURE.

By SAMUEL CHAMBERLAINE, M. D., *of Philadelphia.*

The Board of Managers of the Permanent International Exhibition having resolved to make of their institution a general school of instruction to Pennsylvania's citizens, of all ages and capacities, and in all branches of useful knowledge, have added to the facilities addressed to the eye, the more directly practical instructions, through personal employment and actual use, both of fingers, of eyes, and of thought. The works of art, painting and statuary, the works of design in the several departments of pottery, glass, architecture, machinery, &c., &c., are exemplified in all parts of the building. Personal employment in the glass works, in the machine shop, in the flax and jute manufacture, gives and will give instruction both to the lookers-on and to those actually engaged in these several departments. The splendid and extensive collections of Natural History, from both vegetable and animal kingdoms, by Profs. Cope and Foote, and of mineralogy by Prof. Dickeson, give ample opportunity for study to persons who wish to pursue the one or the other of these studies, or any of their branch studies. Music and the light and innocent stage performances give entertainment, and also a special sort of instruction, to those who eschew the graver studies, and cultivate the ear.

In the organizing of a silk school, an education of a more extensive sort has been projected. It has been the aim to educate the whole State, and perhaps the entire country, to the processes of a new, though by no means unknown, industry. In claiming such a purpose, however, due recognition must be made of the efforts put forth by the Agricultural Department at Washington, under the Hon. W. G. LeDuc, with the important professional aid of the United States entomologist, Charles V. Riley; nor can we overlook the establishment in Kansas of a silk village, as well as silk manufactory, by Mons. DeBoussiere. To introduce a new and unpracticed industry amongst our citizens requires that education be directed to the several classes into which we may, for convenience, divide them, as into the urban and rural classes. Clearly enough the practical work of silk raising belongs to the rural classes, and these have the most direct interest in it as an industry and a source of income. But the city peoples, for the most part, hold the means without which it is impossible to properly "plant" the industry. It has, therefore, been sought to familiarize the city visitors in the silk-room with the several processes, and to inform them respecting the direct and indirect profits from the culture; that these, if wealthy, may see the policy and wisdom of so establishing an example school, that the rural citizens may take hold of it at their country homes. To the elder citizens, the parents, it has been urged that a home industry was wanted for their daughters and younger sons, and that an outlet is needed for the moneys laid up in bank, and kept useless, while this industry would cause it to circulate, and so increase. To the patriotic and benevolent, to whom wealth has been given in trust, it has been shown that idleness and poverty may be in part prevented by setting to work those who are so situated that they can work in silk and cannot obtain work of other sort. For all these a silk-room school, where the silk worms are to be seen feeding, spinning, emerging from the cocoon, and finally laying the eggs of a next year's crop; and when reeling, in its easiest and simplest method, is seen to be performed, becomes a school of instruction, and the means of inducing such as can do it, to take hold upon the new employment.

It was with great propriety, then, that the president appointed the lecture-room of the educational department for this new species of education. Here was already the chimney for a stove; here large and airy windows, an exposure towards the north, with but little sun and with sufficient air. Here shelves were erected of convenient height, length, width, and weight for feeding an ounce of silk worms' eggs. Near at hand, within a mile of the building, were mulberry trees which the birds had providentially planted in the park, and which the park commissioners kindly consented should be stripped. The manager, having several years acquaintance with the subject of silk raising, collected a class of young ladies to assist in the several parts of this business. They were instructed in the art from the hatching of the eggs to the spinning of the cocoons, and will be shortly in the process of reeling. Eggs were shown them such as the Japanese have the art to fix (by confining the female moth) with great regularity and evenness upon their cards of silk-made paper; others from which the incipient silkmaker had issued leaving but the shell with its invisible (except by the magnifier) orifice from which it had escaped. They were set to feeding the silk-worms with the fresh leaves that hired boys brought in from the park. They assisted in cleaning the shelves, removing the debris, and in carefully picking off from the dry and leafless branches the laggard worms that by a strange instinct often kept fast to them even when fresh food was offered.

In all this the young ladies were learning *to do* by *doing*. They were also directed to observe the habits of the silk-worm; how at certain periods the insect would stop eating, would raise his head and, giving a vigorous shake from side to side, would show his uneasiness at the constriction of the old and new dry skin; or, perhaps, by such effort break it in order to come out, fresh and glistening, in his new, elastic covering. So, when the period of spinning approached, the ladies were shown the efforts to wander, the tendency to climb, and the peculiar erect and waving attitude of the head, as if weaving in the air, as signs that the branches must be placed for them to climb into and spin. Very soon they saw these branches of the mulberry, tied at the butts and spread out into arches between the shelves, and were made to observe the more advanced silk-worms climb into them and commence the cocoon, soon to hang like rich, ripe fruit among these branches. When the insects had finished their cocoons, the ladies assisted to gather them and strip off the floss-silk before the moths could escape from them, and before they were steamed to kill the crysalis. Thus practical instruction has been given, while the theoretical has not been omitted. To aid this latter purpose the microscope was introduced and the structure of the insect shown and explained, and the rules for its treatment during the highly artificial life it must lead, were enforced by the exhibit of injurious consequences from neglecting them. Such has been the instruction given, and this process has been repeated in August and September, for a second crop of silk-worms, of less number than before, has served to renew and fix the practical lessons of last month.

It was hoped that another class of somewhat different material could be gotten up—a class of young men who should have learned through daily lectures the entomological history and position of the insect, its economic value, its importance in commerce, in the industries of the nations that now raise it extensively, and the social changes that may be brought about through its introduction into our State. The school was not yet ripe for such a course. It may yet be added on, if the culture be adopted by the agricultural community, and the means for a much more extensive example school can be procured.

This school is intended to carry its influence into all the district immediately around the city. If favored with success, then branch schools along the lines of the railroads, at the stations of ten miles or less apart, will carry that influence over all the State. But the first expectations are, that citizens within fifty miles about Philadelphia and dwellers on the line of the Pennsylvania railroad, will be induced to engage practically in the culture. Already has this influence been exerted. We have sold eggs and worms to persons who have already begun it, and we receive continually letters from others who propose to engage in it next year and who regret that they did not know sooner of the school's existence. To these the educational influence of the school will be exerted in giving information upon all subjects connected with the business. On a statement being made of the circumstances, place of living, vicinity of trees, &c., advice will be given as to the space, number of worms, amount of labor, &c., which can only be obtained by a long study of the subject and access to the many publications that have been issued in former years, and when desired books will be purchased on commission for parties wishing to have them.

The school will become the source whence eggs can be directly obtained or silk worms while very young, by those who have not procured the eggs, or who have not the facilities for keeping them cold during the critical period between February and May, when they are liable to hatch before their food has grown. From it will be obtained also reels and whatever paraphernalia may be thought necessary to the raising and reeling silk.

It will be in time, a depot for the purchase and sale of silk, from the egg to the raw silk, ready for the manufacturer's use. It will be especially a depot for purchase of cocoons. Of the causes that have delayed the introduction of this culture, the want of such a depot stands most prominent and first in order of importance. It was the want of this ready sale, after 1840, that induced the young women of Connecticut to cease producing silk, although their families had raised it for seventy years, (Cobb.) The mills bought it in quantity from abroad, and gave no encouragement to the many who would have raised cocoons at the most moderate price if they could have felt sure of selling them. When reeling shall be established here a ready market for them will be made, and the neighborhood will raise them in all abundance; for they did so in 1830-40, when no such market was at hand.

The school will send out into the country districts teachers qualified to introduce the culture into country families. A practical acquaintance with it will enable the young lady or young man who becomes the teacher, to introduce a fascinating and useful employment for the spare hours of his pupils; at the same time, the introduction, through it, of the science of entomology will heighten the usefulness of the teacher, and open the minds of the children to observation of the works of the Great Creator. This beautiful science, so long obscured by lengthy and too often unmeaning technical names, has been opened to the general public of late, through cabinets and pictures, and books with interesting and even entertaining accounts of the habits, lives, and products of insects. It has been brought within the capacity of all, and relieved, in great measure, of the forbidding aspect of hard names. It leads directly to the cultivation of silk, the raising of honey, the production of wax, of cochineal, and to the modes of destroying insects that are injurious to the crops.

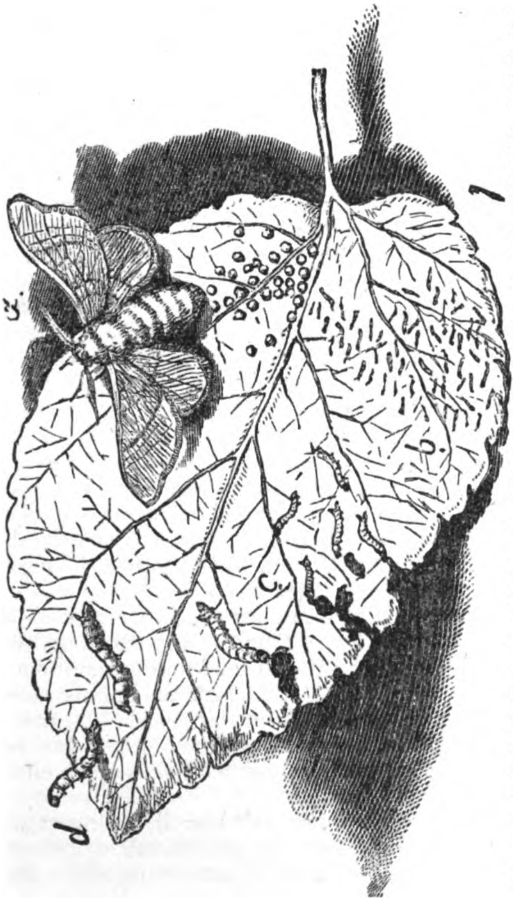
The silk department of the Permanent Exhibition began its operations in May. Eggs had already been procured from the Agricultural Department, at Washington, by Mr. Horace J. Smith, the assistant president, and were kept in his ice-house, secured by paper wrappings around the tin box in which they were sent, from dampness of the surrounding air; and, for further security, this box was again enclosed in another, and the last suspended in a large deal box, which rested directly upon the ice. The spring was unusually backward. The leaves of the mulberry did not appear until the 10th of the month, and only by the 15th had they reached the size ot a silver half dollar; when it was judged proper to bring them out for hatching. The temperature, at that date, was very high, being above 80° in the silk-room. It is of the greatest importance to the successful hatching of these eggs, that they be not subjected to great and sudden variations of temperature, and to bring them from 50° in the ice-house, it was thought best to leave them for a while in a cellar, at 60°, and to bring them by night to the silk-room, where the temperature had fallen to 74°.

The room had been prepared for the culture, by erecting several tiers of shelves, of a hight and size convenient for use; four feet in length, and fifteen inches in width were found to be more suitable and more easily manageable than the longer and wider shelves that have been commonly used. Some of these were made of poplar wood, half inch thick, and were much more handy than others of seven eighths, pine. The space of one foot between them gave ready access to the furthest silk-worms, and is believed to be the most proper distance for them.

The tiers were placed in the center of the room's length, giving ample space, in the large rooms of this fine building, for the crowds of visitors that soon began to see and admire the operations of producing silk. The windows and door of this room were covered with wire-screens and gauze, to keep out the insects, and the birds that were ready to prey upon the silk-worms, both from the park without and from the interior of the building, which was infested with sparrows during all the feeding season. No special arrangements for ventilation were deemed necessary; since the space was ample, and little danger of over-crowding. A stove served to raise the temperature, which fell to 60° about the 22d of May; and no damage resulted to the silk-worms from the change, as was feared would be the case.

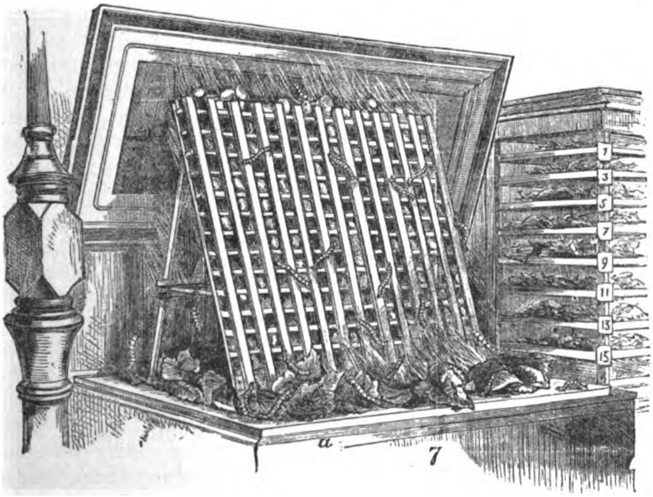
On the 20th, five days after exposure to the air, and the ordinary temperature of the room, the eggs began to hatch. Some, that were procured from France, hatched very nearly together; others, that had crossed the ocean from Japan, and again others, raised by Prof. Riley in Washington, hatched only in part; and of the former, all the worms died immediately from the egg. As all had undergone the same treatment, and were placed under the same circumstances, it is difficult to find any cause for the difference of result between the Frence and the other eggs. Probably a more hardy variety of silk-worm, naturalized, if not native to this country, will be found to give more sure results in future.

The Plate No. 1. represents the insects immediately after emerging from the eggs. It does not show the little white shell, nibbled on one side, and the oval, ragged edged opening out of which it had crept, and which a magnifier enables me to show to visitors, who compare the large, well grown silk-worm with its minute habitation of a few weeks or days back. It does show their successive ages, or the increase of size after each molt. Like all the animals of the invertebrate order, or more generally like all animals, the silk-worms change the skin periodically; the period being five days for the first, and ten days for the fifth and last molt. Each such period constitutes an "age." It is a time of danger. It is often called "sickness." Whatever cause of weakness has occurred, whether in the egg state or in the earlier ages, is likely to result in the death of the insect after a subsequent molting; when, therefore, the sudden lowering of temperature occurred in May, it was feared that the third or fourth molt would prove disastrous, and that many would die; this fear was not realized however, the total losses did not quite



reach two per cent. of all that hatched. The molting is caused by the growth of a new skin, or rather epidermis, within and beneath the old, and is equivalent to the casting of the skin by the snake, the shedding its hard covering by the crab, and to the shedding of hairs or of scurf in the higher animals. The old skin becomes dry and hard, it constricts the little animal within. He shakes and jerks his head to free himself from the incumbrance, thus furnishing one of the signs pointed out to the lady scholars. Before ridding himself of it he ceases to eat, remains quiet for several hours, for a whole day at the fifth molt; then fixing his hindmost prolegs to a leaf or twig, he swells till he bursts the skin and emerges from it, often with a helmet-like head-covering upon him; gradually he pushes down the old skin, by successive swellings, and withdraws his hindmost legs last. When the molting is completed, and after a short rest, the silk-worm begins again to eat, and eats more voraciously after each period; so that at the last period he appears to be incessantly eating, and it then becomes quite a work to keep them supplied with sufficient food. It is at this last period that the real work of feeding must be gone through. Before and after this, it is all light enough. Fortunately it lasts but ten or twelve days.

The proper food of the silk worm is the white mulberry or the smooth leaf purple mulberry. The rough leaf black mulberry is too coarse. The silk worms die when compelled to eat it. The multicaulis or many stalked mulberry, which constituted a very small base of the great pyramid of speculation, debt, and dishonesty, that set up in 1830, and fell so disastrously in 1840, with wide spread ruin to the country, is now but little esteemed by silk growers. It is thought to be wanting in some of the nourishing elements that the first named mulberries possess; and the fact that it wilts sooner, has turned their opinions against it, especially for late summer feeding. It is customary for the Chinese and Japanese to cut the leaf very fine and sift it over the young worms, just when they come out of the egg; this was not done at this time. Small twigs with very tender leaves were selected and laid beside the cards or cloth containing the eggs, and the insects were not slow to fasten upon them at once. When the feeding shall be done on a much larger scale, it will be proper to adopt a mode, (Fig. 7,) which the long experience of those nations has shown to be eco-



nomical and safe. Much of the labor of cleaning off the debris of the leaves and the droppings from the worms will be avoided by cutting the leaves, and the clinging to the stalks, which engaged the class of young ladies in picking them off, would also be prevented. When the silk worms of the earliest hatch reached the age of about seven days, mosquito netting was stretched across a frame of the size of the shelf. On this fresh leaves were placed and the young worms, attracted by the smell, soon crept through the meshes and were then easily transferred to other shelves. In this manner the over-crowded numbers were divided amongst several shelves; and the more vigorous and quick feeding worms separated from the laggard and less thriving ones. When advanced to the third week, frames with twine netting were prepared, one for each shelf and an extra one for each tier of four shelves; and by their means the cleaning of the shelves, taking away the droppings and the dry and half eaten leaves, were readily effected. The feeding mostly upon the wicker frames, (hurdles, they are called,) permits the air to pass freely beneath the leaves, preventing mold and moisture and the odors that are so often complained of in the European cocooneries. It is to the dryness and cleanliness maintained through these hurdles that sickness and disease were averted from the worms.

When four weeks of feeding were accomplished, a little white cocoon, almost concealed amongst the leaves, took us somewhat by surprise. The signs of "rising," *i. e.* climbing to spin, had not been shown in a sufficient number to attract attention. Immediately we tied together the dry branches of the now leafless twigs, and placing them in bundles between two shelves, arched and spread them over at top, so as to give the largest possible surface for attaching the cocoons. They were like miniature trees between the shelves. The more advanced silk worms were not slow to take advantage of them. They were soon to be seen climbing into them and attaching their gloss silk, like stay ropes for the future cocoon, in its midst.

A somewhat different arrangement is shown in Fig. 2. This exhibits one cavity, an inch and a quarter square, in a frame covered with slats crossed at right angles. The plan is better than that of the branches, because the floss silk can be collected without the entangling dried leaves, which must afterwards be carded out. Somewhat similar was the method adopted here with many of the shelves. The twine woven frames, now no longer needed, were placed two together between the shelves in an inclined position, and many cocoons were spun in the space between the strings. Both gave rise to many exclamations of pleasure at the sight they presented to the many visitors calling at the silk room. The branches were like little trees covered with ripening fruit—the hurdles, like trays filled with the fruit ready for use. Many persons watched with intense interest the process of weaving by the silk worm, who could often be seen dimly through the semi-transparent covering of the yet incomplete cocoon, and whose movements, as he continued

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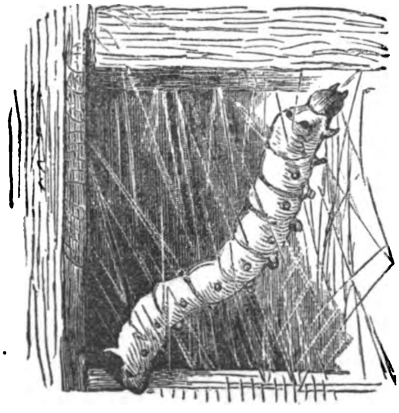

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to spin, were plainly visible. The cocoons are quite well figured in Fig. 3, except that they want the constriction in the middle (as if tied with a string) which marks the male, and which is indistinctly seen in the female, also, for the most part. The silk worm is understood to complete it in about five days. He then undergoes a change which converts him into the chrysalis, and in which he bears no manner of resemblance to the caterpillar that he was, nor to the moth that he is to be. The chrysalis is represented in Fig. 4. The lower portion, with the oval breathing holes, (spiracles,) recalls the worm, whose rings have contracted to the present shape. The upper portion exhibits the outline of the future wings, antennæ, and feet. The skin is smooth, dry, and of an uniform brown color. Within the chrysalis, and beneath its skin, the moth is developed. It differs wholly from the smooth, or hairy, or tuberculated skin of the caterpillar, and from the plain, brown skin of the chrysalis. Its outer covering is of scales, divided so much like feathers that they are often called so. It has wings which begin to expand as soon as it has emerged, being infiltrated with air and with the fluid that we should call blood, if it were red. A very correct engraving of the female moth is seen at Fig. 1, *a*, depositing her eggs upon the leaf. She first throws out from the mouth a salivary liquid that has the property of softening the gum of the cocoon, and then having burst the skin of the chrysalis by her own growth within it, she pushes her way out between the fibers of the silk, which are so weakened and stretched that the thread is sure to break at that point, if the reeling be attempted. For this reason it will be a great triumph in the art of silk raising if we should succeed in domesticating the caterpillars of the Cecropia, the Polyphemus, the Cynthia, and the Actia Luna moths, which weave their cocoons in such manner as to leave a natural opening for the moth to escape without injury to the cocoon. Two of these, the Cecropia and the Polyphemus, we are now engaged in domesticating. Their cocoons are much larger than those of the common silk worm, the one twice and the other three times as large, and, if we can reel the outer covering also, as seems probable, then about five times as large. The silk is coarser, but has a fine gloss and seems to be fully as strong as the other. When we shall have raised these upon the mulberry instead of the birch, on which they are now feeding, we may expect to make as fine and as white a silk as the usual kind produce; and if so successful, we shall have the best opportunity that has ever been presented of transferring the raw silk product (and with it a larger silk-weaving business) to our own shores. These moths are flying constantly about us, and are well known as beautiful "butterflies," while their caterpillars and cocoons are but seldom seen and but little known. We ought to utilize these native silk worms.

Before the moth has spoiled the cocoon and escaped, two things, involving some labor and care, must be done in the stripping of the floss-silk or loose outer covering with the adhering dry leaves, and the separation of the best and most perfect cocoons for eggs of another crop. Then the remaining cocoons must be steamed, or exposed to the sun, or to the heat of an oven, to kill the chrysalis and preserve them for reeling. All this labor, about one fifth of the total, would be saved by the domestication of the now wild silk-worms.

The male cocoon is known, not certainly, however, by the constriction in the middle, as of a full bag tied in the middle with a string. After issuing, he is known by the smaller body, and especially by the constant fluttering of the wings. Neither male nor female flies. They do not leave the shelves or box (see Fig. 5) in which they are placed. It is recommended to run a needle with long thread through the floss silk, and thus string and hang up the cocoons, that when the moths issue they may not become entangled, and when laying eggs may not place them upon the cocoons. The number here used for eggs was too great for this to be done. They were placed upon the feeding shelves, the cavities darkened by sheets of paper, and papers carefully weighed and marked were placed for the laying of the eggs. Upon these the united moths were put, and their eggs were laid with tolerable evenness upon them, though not so uniformly as the Japanese cause them to be laid. When dry, the papers were again weighed and marked and the number of eggs approximately obtained, forty thousand being allowed for the ounce avoirdupois. About twenty ounces of eggs were obtained, or nearly eight hundred thousand eggs, and these are now in safe keeping in the assistant president's cellar, boxed in tin, wrapped in paper, and again boxed and suspended, as were those at first obtained to begin the culture.

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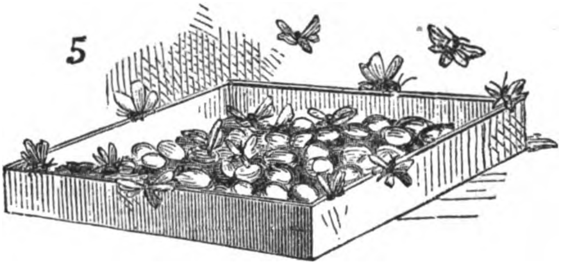
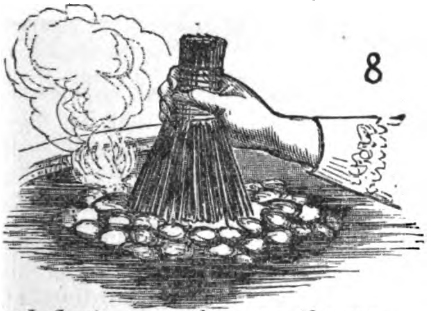


These eggs have been freely offered by the managers to various charitable institutions, whose inmates, it is believed, may be greatly benefited by this light work, relieving the tedium of a monotonous life, while adding a little each to the general aggregate of cocoons for reeling, and becoming themselves producers to some small extent. The institutions for the deaf and dumb have been especially invited to take up this industry, as one to which their misfortune presents no hindrance, and the asylums for the insane, as one by which a select number of their inmates may be mentally benefited. The rest of them, beyond what will be wanted for the coming year, will be offered in small quantities at reasonable prices to private persons who may desire to commence the culture on a small scale with a view to future increase.

The second stage of silk culture, the reeling, by which the fine delicate string of three hundred and fifty to five hundred yards long is disengaged from the gum, which binds it into a cocoon, and is run out into one continuous thread, has not yet, at this present writing, been accomplished. A reel of exceedingly simple construction has been prepared. It is such as can be made by any well-skilled carpenter, and may therefore be constructed at small expense in almost any country place. There is no mystery in the art of reeling. It can be learned by any one in a few trials.

To acquire skill in reeling, however, is by no means so easy. It requires supple fingers, a quick eye, and a habit of close attention; and these are to be attained by early training. It is to acquire these, both for the rearing and the reeling, that silk schools are necessary. And when it is understood that the superior quality of French and Italian raw silks, without which they could not produce their best fabrics, is due to the early training at their silk schools, the policy of introducing such schools here is apparent. With a training school for young persons, a general engaging of the rural population in raising cocoons from the naturalized wild silk-moths, or even from the common silk moth, there is no doubt that a business in silk can be done in this country fully equal to that of France or of Italy, or of the two combined; and when this domestic industry shall become established, we shall no longer import silks at all, but sell the products of our mills and the productions of our trees to all the nations that now use or buy silk.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The difficulty that presents itself to most persons is "how to catch the true end of the thread." Fig. 8 shows how this is done. The boiling water dissolves the gum. The true end floats somewhere on the surface of the water. The twigs of the bundle, or the straws of a whisk brush, stirring the cocoons around catches and entangles it, and lifts it together with many false ends of floss silk only, but these soon run out and off. (See Fig. 9.) The line thread remains it is detached and laid upon the edge of the vessel. Then others are caught up to the number of twenty, fifteen, ten—never less than five—and these are twisted and thrust through the eye of glass or porcelain, as seen in Fig. 10, and so carried to the reel. Fig. 11 is much such a reel as was used at the Brazilian exhibit in Machinery Hall during the Centennial. It is more complicated than is necessary. The lady is selecting new threads to supply the place of any that break or run out. She must keep up the

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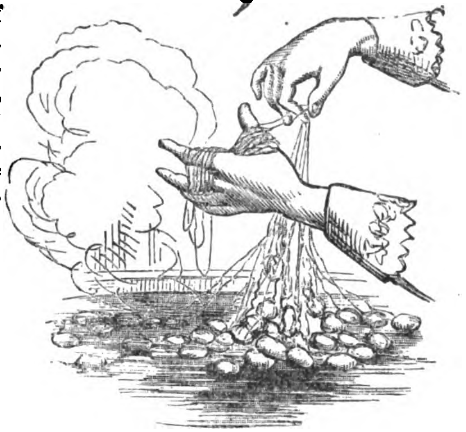

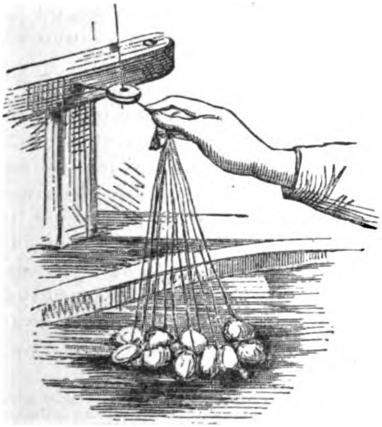
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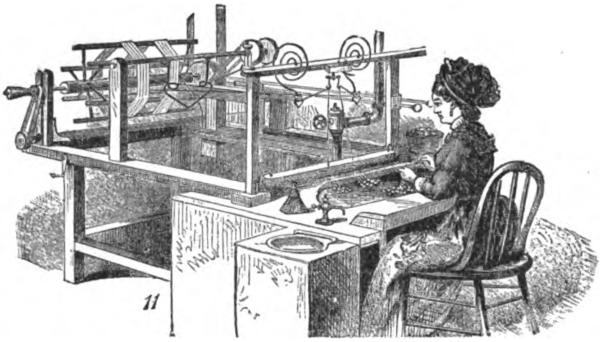

number of the threads with which she began, or her reeling will be uneven. She must do this very quickly or she will lose so much time that her reeling will be unprofitable. She must learn to supply the break as soon as it occurs, and must therefore bend all her attention upon the work. Moreover she must learn the proper temperature for the water, and must see that it is kept up and is not excessive. The neglect of this involves consequences in the subsequent operations that might render her skein unsuitable for the mills, and therefore unsalable. But early training and practice overcome all these difficulties, which are no greater for the American than for the Italian or the French girl, and which she will soon learn to master.

Silk culture will necessarily be conducted by a few only in the community, and those few will be the persons who are unfitted for other employment. It will not take any one from business in which they are now engaged. In the first place, it can only be carried on by those who have ready access to the mulberry or to the osage orange, and who reside in the country. It will be most suitable for families where there are many children of various ages, or who have near neighbors with children who could be employed. It will suit those members of the family who have least of the serious work to perform, and whose engagements leave some hours of the day free for attendance upon the insects, and for reeling the cocoons. It will suit especially those who, being partly or wholly dependent upon their relatives, can find no means of providing for their own support. To these, even the small sum to be acquired by raising a few cocoons will be important, while the aggregate will amount to a large sum for the State and the country. When a whole family or a neighborhood takes up the industry, they may add from fifty to three hundred dollars to their income.

This was done in Connecticut fifty years ago, and may be done now in Pennsylvania. There are trees enough and unemployed people enough in the State to raise all the silk used by our mills, and to add to her income the annual six millions that goes from the United States for this material. In 1876, nearly twelve millions, and in 1877, eight millions were sent away for this purpose, while thousands of our citizens were asking or begging for work to do. If this culture were generally introduced and established, we should not hear of *women being employed in field labor, as we are credibly informed is now the case within fifty miles of Philadelphia.* The writer when hearing this lately was incredulous. The repetition of the statement by various persons, however, has shown it to be true that well-to-do farmers within that circuit do now, in this nineteenth century, and in the midst of all the intellectual culture of this age, not *only permit but require* the females of their familier to do the field work that is so wholly unsuited to them. What wonder that the neighborhood is infested with tramps. When women are placed in the harvest field, behind the counter, in the drug shop, and even in the courts of law, what is there left for men to do? It is a mark of a low state of civilization when the women are allowed to perform work that necessarily lessens their refinement and delicacy. Not that work of any kind is in itself degrading; but refinement and delicacy are not compatible with such employments. On the other hand, all the processes of silk raising tend to the cultivation of the intelligence, and with it the practical skill that refines the touch and educates the eye; they belong to women. They are the works especially suited to her, and women, if trained and educated while young, are better suited for these than the other sex, and are far better suited to them than for many of the employments into which they have been brought during the past thirty years.

At the meeting of the State Board of Agriculture in June, three gentlemen, who had traveled abroad, testified to the fact that the silk districts of Europe are the centers of intelligence and education. It was in confirmation of a like statement, quoted from the words of Henry C. Cary. That Pennsylvania needs such a civilizer is shown by the degrading fact that her women are allowed to do field work. But if further proof of the need is asked, the statements of the papers respecting the Raber murder furnish it at hand. No one could read the accounts of the brutality, and ignorance, and coarseness of the female crowd who attended that trial without feeling that there is great need of a civilizer amongst them. If haply the introduction of silk culture should bring those degraded, coarse, and ignorant women away from.their field work to the delicate processes of raising silk, it would elevate the tone of society around them, would make them better daughters, wives, and mothers; and end such scenes of wretchedness as were exhibited on that trial.

Our importations of raw silk increase by a regular rule that gives assurance of the continued demand for this material. The average yearly value of these importations double every five years. This rule was interrupted during the five that included the civil war. There was, however, no decrease, but a slight increase of the average as compared with that of the previous five years. The next five, however, doubled the former average; and again, the succeeding five. Two years only of the half decade we are in, are known to the writer, in 1876 and 1877. The average of these was double that of the preceding five years. Of 1878, and 1879, and 1880 shall maintain the rule, we shall have sent out ten millions each year; and the prospect is that twenty millions annually will be sent in each of the next following five years. If, however, the citizens of Pennsylvania shall be so wise in forethought as to prepare her rural population by a permanent silk school, she may detain this sum, or a large part of it within her borders, and benefit all her people, but especially her female population, and more especially those who are now called upon to do man's work in the open field. Twenty millions, ten millions, or five millions circulated in the interior of the State would make many families happy, would relieve very much of the distress that stagnant business has caused, and would no less help the urban populations who now suffer for want of trade. Twenty millions, ten, or five millions produced annually from her unutilized mulberry trees will yield more prosperty for the State than if every well dug or bored within her borders produced gold as the well in Glen Riddle; for these would make the labor, which alone gives value to the gold. Twenty, ten, five millions produced by the house work of her female field hands, or by the intelligent industry of unwillingly dependent idlers, will carry education, social comforts, and a higher standard of civilization amongst the men whose low morality permitted them to plot deliberately against the life of a fellow citizen for money, and amongst women who could bear willing witness to procure a father's execution. No better population can be found than that which constitutes the silk districts of Italy, and France, and Switzerland. They are peaceful, law abiding, moral, intelligent, and at Mr. H. C. Cary and others have said, are the very centers of refinement, of culture, and of art. Silks schools, just started by Count Dandolo, in 1780 have made these countries rich, have procured this refinement and culture for them; will not Pennsylvania be wise enough to set up such schools, and to diffuse amongst her citizens this culture of the fingers, the eyes, and the mind. One has been started here by the managers of the Permanent Exhibition. Its continuance depends upon the permanence of this building. A needless edict for its removal has gone forth, and if put into execution the school must die with it. But Pennsylvania's agriculturists may still plant other schools that shall fix the industry permanently upon the State

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The question before the Board being upon the foregoing essay,

Dr. **JAMES CALDER**, (president of the Pennsylvania College,) said: I have been exceedingly pleased with the able essay that has been presented to us, and I feel that it is due, not only to the writer, but to the great cause that he represents in his production, that his effort be heartily indorsed here. As Americans, it is our duty to do all we can to develop all the resources of our land. While we seek to produce harmony and peace throughout the land, it is also for us to look to our self-support, aside from that of self-protection. We owe it to our Creator, that we shall develop speedily all the resources with which he has blessed our favored land. Further, we owe it to the rising population that we shall give to them as various opportunities for self-support as may be practicable. There is such a variety of talent, that it is our duty to give each one that calling which is peculiarly agreeable to him, and in accordance with his talents. In addition to these recommendations there is this truth, that in America, and very much more in China, silk culture is highly beneficial. Is is refined. We do not find that there is anything gross or low about it. The tendencies on the part of those who grow the silk worm, are upward, rather than downward, and those engaged in this culture are better than those around them. Now, in reference to the city of Lyons, if that is all true, here is another reason why we, as cultivators of the soil, ought to use our efforts in favor of this culture. What has been said here to-day, ought to enable us honestly to profit therefrom, and it should be an incentive, for some of us at least, to give more attention to the culture and manufacture of silk. Before we leave this place, let us learn what we can about this valuable occupation, and when we go to our homes spread the information, that it may be put to a practical test. If successful, we can soon make it known that we do not need to send away for our raw silk. After we begin to make our raw silk, then we can turn it to the various other forms that are particularly desirable and profitable.

Mr. **HAZARD**, of Philadelphia. We have heard from Mr. Chamberlain, who is an enthusiast in this matter. Some persons suppose that because a person is enthusiastic on a subject, that that subject cannot stand the test of actua experiment. We will feel very much less likely to try the experiment, because some thirty or forty years ago the enthusiasm ran very high in the land, and many were ruined. I think we can have this carried out as shown by Prof. Riley, who has published an excellent work on the sub ject of silk culture, if more persons would come here to see how easily this thing can be done. It is generally supposed that mulberry trees are necessary to raise the silk worm, but it can be fed on the osage orange, and the lettuce, also, I believe. I remember, when a boy, as do others of my age, that we used to feed the silk worms with a great deal of profit and pleasure, and I believe that very same process can now be carried on successfully. Suppose a member of a family would take care of a number of these, and would allow them to spin their cocoons. In almost any family there could be produced from one to five pounds. The children could raise them, and thereby put a little money in their purse. I believe this matter to be thoroughly practicable, and I trust we will endeavor to increase the production. I hope we will all get pamphlets from the Commissioner of Agriculture, and endeavor to intoduce the growth of the silk worm into our families and neighborhoods.

Dr. John P. Edge. I heartily indorse the position taken by the essayest, and those who have followed him in this discussion. It seems to me, that in the course of time many of our people will be driven to silk culture, as a dire necessity. It is true, too, that large portions of our population will be driven to some other pursuits. They are now being driven away from many occupations, by the introduction of machinery. Silk culture cannot be carried on by machinery. Now, in the manufacture of flax, much of it is done by the use of labor-saving machinery, thus driving out hand labor. So with cotton. In regard to the care of the silk worm, I think there is no question about it. In Berne and Zurich, in Switzerland, almost the entire production is silk, and Zurich is the great center of Switzerland. I believe the people there have the best reputation, usually, of any part of Switzerland. So in Murane, the center of Sweden, which is considered the home of drama and song, and the character of the people there indicates a very high degree of cultivation. I think that in the country around Lyons, Zurich, and Murane, where silk culture is the predominant pursuit, you will find corresponding with it a high tone of civilization and intelligence.

Mr. Thomas Meehan. The poetry of silk culture has been very well placed before us; but before we engage in the culture of it we may ask will it pay? And that is a very important question. For my own part I think it wise to look at the past, ascertain the causes of failures, and then see what can be done in the future. I believe there was a time when silk culture was very profitable in this country, and generally practiced. We know some thirty or forty years ago it was discontinued, and very few persons seem to have any distinct idea why it was discontinued. We may perhaps learn a lesson from this discontinuance, and whereby to obviate the difficulties then experienced. Of the cause of failure very little is known, but many believe it was a sort of speculation, and that failure was a mere bursting of a bubble. But it was by no means so. They cultivated the morus multicaulis, which is a male variety, and must be raised from cuttings, instead of the morus alba, which is raised from seed. Thus a disease was communicated from tree to tree, and the silk-worm feeding on diseased leaves became diseased. I live in a part of the State where the German population engaged in silk culture and gave it up because of this disease, and not because it would not otherwise pay; and the remains of the silk culture are there to this day. One of the buildings remains standing. The only reason for the stopping of the culture was this disease in the multicaulis. [Several sentences of the speaker, through the organ's sounds, were here inaudible.] The habit of taking off the leaves of the mulberry trees is naturally weakening, and male trees always have less vital power than the female; and from the continued loss of leaves they became more easily diseased. A large male tree is still in existence there, and continues to have the disease—large branches dying annually. The worms were fed on the leaves; ate the germs of this fungoid disease; the disease was thereby carried to the worms, and then it spread through whole colonies. This is the only reason why silk culture failed. We know it now. Then nobody supposed that the fungus had anything to do with the silk-growing or the silk-worm. Men like Prof. Barbeck had not investigated. We can profit by not using that particular kind of mulberry, or in not feeding the worms from that diseased variety. I believe that if we take care to prevent the disease there is nothing to prevent silk culture being a success. I look forward to the time when we shall exercise care in these particulars, and when we shall have silk culture among the profitable industries of Pennsylvania. (Applause.)

Mr. CALDER. What does Mr. Meehan think of the Downing mulberry tree as food for the silk-worm?

Mr. MEEHAN. I do not know, sir; not having had actual experience.

Mr. CHAMBERLAIN. It has too rough a leaf, and will only produce coarse varieties of silk. The white mulberry is the kind of a tree to grow.

Mr. SMITH, of Bucks county. How much could a man earn at this business in a country where silk is raised?

Mr. CHAMBERLAIN. He could earn about as much there as he was worth. In the State of Connecticut, in 1825, we have a work by Prof. Cobb, who investigated the culture of the silk-worm. He found the culture of the silk-worm had been carried on there in families for seventy years. In single families they were enabled, in addition to their other duties, to produce from ten to one hundred pounds in a season. We could easily get at the value of the work by getting the average price of silk. It has been six dollars a pound as an average on all grades, and therefore their production averaged from sixty to six hundred dollars. This was not carried on for wages, but was clear gain in every respect. It took them from no other work, and did not interfere with their other duties at all.

SEX IN PLANTS.

By THOMAS MEEHAN, *Botanist of the Board.*

Mr. PRESIDENT AND GENTLEMEN OF THE STATE BOARD OF AGRICULTURE: I cannot better introduce the question assigned to me than by reading an extract from a very prominent author, bearing somewhat upon this subject. The quotation which I will read is from Darwin's work on "Cross and Self-fertilization in the Vegetable Kingdom," tenth chapter: "We certainly owe the beauty and odor of our flowers, and the storage of a large supply of honey in them, to the existence of insects." A point which Mr. Darwin wishes to bring forth very strongly is that flowers require that the pollen of one flower, the male element, must be brought to and mixed with the female element in another flower, in order to serve the best interests of the race, and sex is looked on as the natural mode by which the species is to be continued. He seems to believe that the object of sex in plants is analogous to that sex in animals. This seems to be not only the view of Mr. Darwin, but of other persons who have written upon the subject. There is very little analogy between the sex of animals and the sex of plants in so far as reproduction is concerned. Of course, in animals, sex is important, but the absence is not so important in plants. My object is to show the different value of sex in plants and of sex in animals. We say, for instance, in regard to animals, that if the sexes are kept separate there is no reproduction, and the races become extinct; but in regard to plants they can maintain existence for centuries quite independent of sexual agencies. We have the evidences of that all around us. Take, for instance, the common red currant in our gardens that is cultivated by cuttings, and we know has been cultivated for five hundred years—and, in all probality, it has been propogated for thousands of years—simply by cuttings, without having recourse in all that time to reproduction through seeds. These cuttings have been placed in the ground continuously, and millions on millions, perhaps, have been raised in that way, so that, in reality, the same individual plant has been in existence, say, for a thousand years, and yet, to-day the plants are just as vigorous and raise just as good fruit as any that is raised from seeds.

We find this to be the case, also, with numerous other plants. There is the Jerusalem artichoke, which is growing into use for cattle feed; but the artichoke has been under cultivation quite independent of the seed ever since it has been known in this country. So with the bananna; it is not known that it has ever been cultivated, except from offsets from the roots; but it bears just as good crops as ever for all we know. The same with the pine apple and sweet potatoe, and many other plants cultivated not only in the tropics, but in the north. These plants are continuously planted in no other way than by cuttings and offsets; and these plants continuously thrive without degeneration, which could not be the case with any species of animals. We see this vast difference between plants and animals, and it is necessary to bear strongly in mind in order to understand for precisely what purpose these sexes in plants are required.

It is plain that the purpose of the sex in plants cannot have reference solely to propagation, and yet it would seem to be, under the theory that Darwin holds; that the color and sweetness of the flower are there that the species may be cross-fertilized by insects flying from flower to flower. As propagation is not essential by seed in plants, may we not say that he may be mistaken in a theory regarding only these objects? We have good reason to believe that there is some other object in Providence, in giving sex to flowers, beyond those merely relating to propagation, as he assumes.

There are two different objects which I have in view in noticing the different design of sex flowers and animals; one the mere scientific, the other the practical results. It is not only Darwin and Sir John Lubbock who have been led into scientific error; for we see the practical results to cultivators, in the theory of T. A. Knight, about fifty or sixty years ago, in England, that individuals (as he terms a plant) run out, in time, unless reproduced from seed. When he found, on planting, say, the Butter pear, that it evidently did not do as well as in years before, he concluded that individuals would not last long; and, therefore, also concluded, as Mr. Darwin has done, that sex must be introduced continuously in order to keep up healthy life, and that this has been the case with those species that have been in existence for all time. It seems, therefore, how practically important it is that this object of sex should be understood, for otherwise we may fall into just such errors as others have done. We find, even in our own country, that the failure to bear these particular distinctions of sex in plants and sex in animals in mind, has led to much profitless controversy in the every day practice of the horticulturist.

For instance, in the strawberry and other plants there are some which have stamens and pistils, or pistils only—hermaphrodites or staminates in each flower—in other words those which are barren and those which are productive; and these things have led to great discussions, whether the sex of one strawberry has changed or has produced the sex of another strawberry. Some would laugh at it, and would bring up as an argument "how can a bull be turned into a cow?" and the other side would say in return that in spite of these comparisons of sex in animals with the nature of the plants, that all knew, who examined the subject closely, that these changes did go on, and plants that had flowers with pistils only would at times bear flowers with stamens and pistils both. Now, persons with no knowledge of plants, yet professing to have knowledge of the sexes of animals, cannot understand this, and thus we see how these old views on the identity of sex lead to a great deal of confusion. Where the right view is held, as I believe, of the sexes of plants, and also of the sexes of animals, there is not so much mystery around these floral changes, but it is rather seen that it is all in conformity with the universal law of nature. I cannot better show this than by tracing the growth of a plant from the beginning to the end, showing first how plants are started and how developed—how after the plant is made the various flowery parts are formed, and how the sexual parts and capsules of plants result. Plants are not individuals in the same sense as animals are, yet trees especially are regarded as individuals. The cells of a plant are much more individualized and numerous than those that constitute the animal structure; and they perform their work in a much more individual manner than in the human body, or in different animals, and thus make the tree itself less of an individual.

In fact these cells often possess very high powers of individualization. It is believed that these small cells, that can scarcely be seen except by high microscopical power, contain within each the form of all the parts subsequently developed into a larger stage of life. This is believed simply from results, for no microscopic power has been able to reach the extent of their minute workings. Taking these single cells as simple individuals, in the lowest stages of plant life, we find them doing their work as individuals, and by single cells; then advancing in the organic scale, we find some of these cells going together, on the principle that in union there is strength, and we have a plant of several cells. Then in a little higher bodies we discover cells in greater numbers, and these taking on a green dress. Still higher we find these green cells as mere green membranes, which you can see covered with their green fronts around earth fountains or damp places. Then they coil and form mosses, and some of these green processes will take the appearance of green grass in time. That is the next stage of vegetation. Thus you see the process from a single cell to a moss, and then, after coiling and uniting below, eventually forms the stem or the tree. First the moss and then the stem, and then the blade, which is advanced until we have the leaves and stem. We have the plant all developed without sexual efforts; within a year this plant is formed and can again be propagated without sex, and thus they can form continuously from age to age without sexual power. This power is seldom used until the higher orders of vegetation have been reached.

Then you come to the flower, the first step in the production of sex. The flower is formed of green blades, just as the stem and leafy structure is, and just as the plant is formed so the flower is formed. To repeat again the cells unite together; first the arrangement is of one leaf which twists, then of two leaves, or to more than two leaves, forming the incipient stem, then two or three coil together, then perhaps five coiled together, and the growth continues in waves until a perfect state is reached. The whole plant is an evolution from the coilings of one single leaf. We often see stamens and petals return to leaves, and often leaves will come in the place of pistils, and when we get to the fruit we may say a bunch of grapes is nothing but a bundle of leaves, which have taken on form, all varied according to the law laid down in a simple cell. Now, when we examine the flower we find the stamens, which are the expression of the male element in the flowers, and the pistils are the expression of the female element. We find them a little further advanced in specialization than the leaf. If you find a plant with only pistils you may be satisfied that there has been an abortion of the male elements, and by the operation of some unknown law, without transformation from stamens to pistils, or where the transferring from the male to the female element is so slight as not to be noticeable. Thus, by simple abortion of stamens or pistils sex is frequently changed from one to the other very easily. So there is nothing unreasonable in the change of sex in flowers, in this sense. It is not only not unreasonable but is an accepted law; but I hope, as we go further, to be able to show the laws whereby leaves can be converted into pistils or into stamens. But perhaps at this stage it would be better to refer to the way that the seeds become fertilized—for there is a use in nature for fertilizing.

In regard to fertilizing, of course every one is familiar with the character of the stamens of flowers. For instance, every one who ever smelled a lily, and has had the yellow dust remain on his nost, must have an idea what pollen is. This pollen has to find its way to the apex of the pistil before the seed will result; and it must be there when the stigma is in a condition for the pollen to germinate, when it sends out root-like tubes, which force their way down the style to the small ovules which then become fertilized and swell, and become seeds finally. This is the point in the life of the plant that Dr. Darwin refers to in the extract already made. He believes that this own-pollen is of temporary value, and he believes that the plants, to derive the best results from the use of pollen, must have it brought from a distance. It must be confessed that there is much which seems to support this. A large number of plants use pollen from other flowers or from other plants, and it must be known that Darwin is not the man to start this or any theory without there were very strong reasons for his belief. There are no doubt various plants that are unable to make use of their own pollen. For instance, there are the Agaves and Yuccas. It is plain they are so constituted that it is impossible to apply, of itself, the pollen from its own flowers, and thus get seed for the continuation of its species; but according to the theory mentioned, unless a certain insect visits that flower, there is no fertilization. That insect seems to have been endowed with some peculiar instinct, and any person who will examine the subject will find therein one of the most beautiful experiences in the plant-life. It bores a hole in the side of the ovary and deposits an egg inside. It seems to know unless the ovary is fertilized and the egg has nourishment, that there will be no life; so she takes the pollen from the stamen and applies it to the pistil, and in that way it becomes fertilized. If annuals, these plants would soon die out; but they have bushy roots, and in that way we find the plants are spread and kept from becoming extinct; for you will always find that the seed bearing does not occur in the seasons or place when the insect is not present. Seed reproduction is dependent on the insect. It shows that there are some instances in which plants cannot be fertilized without insects, and have no power to perfect seed by their own agency alone. I have particularly in mind, while making these remarks, the Adam's needle and thread of your gardens—the Yucca. It seems to require absolutely some external agency. Therefore, we find it very frequently without any seed.

It is on such facts as these that Darwin and his friends assume it to be necessary for the whole vegetable kingdom to be cross-fertilized in order to represent the best advantages from cross-production of seed; but it is well worth bearing in mind that these cases are limited, and that plants that certainly require aid are found in very limited localities. For instance, this yucca family is only found in few localities, and dry and arid regions—one limited to Colorado, one limited to Texas, and one along the sea coast of Virginia and North Carolina; and it is also worthy of note that very often, even in these localities, from some cause or other, the insects do not exist, and if they do not exist for a very short period, you may go into those same localitien and not find a single seed. Therefore we say if nature intended sex especially for reproduction by this way of obtaining seeds to be regarded as desirable, she has run a great risk, because only for the tough perennial roots they would die out in one season.

That plants do live for ages without the intercession of insects to produce seed, or without seeds at all, has been shown; and that the sexes of plants are not for the mere purpose of continuing the individual, but for some other purpose, because plants will live ages without the functions of sex being carried on. Indeed, you will find in all plants where there is any obstruction to the use of their pollen, and made them dependent on insects or cross-fertilization for seeds, that nature has also provided liberally other ways whereby they may make their way over the whole world, as we see in different perennial plants, and we may at once doubt that, if Mr. Darwin is in error, it arises from a mistaken view of sex—from his belief that the sex in plants and animals have identical reproductive purposes. I think we may conclude that sex in plants is intended, in the main, for some different object to that in animals. For my part, I believe that sex in plants is chiefly made to give variety to vegetation. That the different animals and insects may more readily distinguish them, and, after that, that they by seed may be better able to be scattered through the world. There are some insects that feed only on certain plants, but, unless a law for variation existed, they, in nature, would be unable to distinguish them. Even among animals, where sex is essential to reproduction, variation must have been in view as one object. It is to sex that children owe the difference between them and their ancestors, or no one would be able to distinguish another from some of our own race—one person from another; and so through sex are differences in plants and animals. Plants, as in animals, may have this advantage from sex, and receive this individual variety somewhat in the same manner, much for the same reason. It is apparent that Darwin and others have had only the reproductive views of sex in mind, because we find that the whole purport and object of the remarks upon odor and fragrance have reference only to reproduction. The theory is that, if there was no odor, the insects could not so well find the flowers upon which to feed, and that the flower has been made attractive to the insects for its influence on reproduction. But an insect must live as well as the plant. If there were no odor or fragrance, the dullest of insects could find these plants. Odor and color aid variety, and, in this way, aid insects to find their special food.

Some plants, as we have described, are hermaphrodites; that is to say, stamens and pistils are found in the one flower. But there are large numbers of flowers in which the sexes are entirely separate—one plant for the male sex, and another particularly for the female—and the separate trees often long distances apart. Take the willow on which you find what are called "catkins." They are the male willow; and the female willows are nearly alike in color, but have little fragrance. Unless acquainted with the fact, few persons would hardly know that they were distinct of sexes.

But fragrance, you will find, is confined to the male flowers, and they are the only ones visited by bees, or so generally so that the bees rarely go to the female. This is quite common among the separate sexed plants. Whoever has passed through an Indian corn field has noticed its fragrance. The Indian corn flower is as fragrant as the sweet hawthorn hedges of England, yet the odor, as in the willow, is confined to the male flower; and that is the case with many species of plants, so far as odor is concerned. In plants of different sexes you will find the odor is confined wholly to the male. In the maple the flowers are separated, generally, on different trees; although they appear to be perfect in one tree, another tree is barren and bears no flowers. The male tree possesses the odor, while the female tree possesses no odor at all. If odor be created to attract insects to carry the pollen from one tree to another, why is the odor confined to one sex alone? why is it given at all to trees which could be fertilized by the wind?

I think, therefore, we may say that the sex of flowers exists chiefly for the purpose incidentally for perpetuation, but chiefly for individualization and the preservation of the race under various adverse circumstances. The individual plant must, of course, have air, and water, and light, and food, before it can keep up a continued existence, and if any of these circumstances are wanting the plant ceases to exist. Therefore the seed comes in very opportunely to keep it in existence, and it is remarkable what the seed will endure so much of what we call hardship, that the plant shall not die as a species. For instance, the common morning glory, (*Convolvulus purpureus*,) which are destroyed by the first touch of white frost, the seeds will endure. Indeed the first frost kills some plants, but the seeds will endure in the earth even if exposed to a temperature of from forty to forty-five degrees below zero, and will start out the first opportune time. The low temperature does not seem to destroy or affect them. It is the opinion of scientists that plant seeds can remain frozen for a number of years, that the different varieties have been carried to the different parts of the world by glaciers, and that when these glaciers melted away, and the earth resumed its original temperature, these seeds sprang up where the glaciers carried them, and thus we have their present existence; that those seeds have been carried from one locality to another, and that they have been made as they are for the purpose of maintaining their existence under adverse circumstances. So we see many objects are accomplished through the sexes of plants besides reproduction. If we can see that plants were created to accomplish these ends; if we can see that one plant must be distinct from another plant; and if we see that tender plants may be killed and yet by their seeds may be distributed over the surface of the globe, we see how small a part cross fertilization or any question of mere reproduction plays through the existence of sex in nature.

Then again there are particular movements in plants, peculiar motions which have little bearing on sex as a reproductive agent, but explainable under the universal law of variation. These motions are particularly interesting. Take for instance our common butter cup, which open at day and close up at night. Other flowers only open at nine o'clock in the morning, and there are the plants which only open from nine to one o'clock in the afternoon, and there are other flowers which open in the evening before the sun goes down, and the night blooming cactus which only open at night.

We can conceive that that has very little relationship to the cross fertilization, because if so, the longer they remain open the greater chances. They that remain open the longest would receive the advantage, especially over those which remain open only one hour, and that an unfavorable hour. If we believe that variation is to extend even to the times of opening, the purpose is clear, but not on any theory relative to reproduction. The general good is served by endless variety.

But very little that we can see from reproduction as the leading element in sex. Then there are numerous facts about flowers which we are unable, for want of time, to refer to now, showing little relation to the objects of sex suggested by Mr. Darwin. For instance there is a peculiar sensitiveness in the parts of some flowers as well as in some leaves, as the sensitive plant, and the clover, which falls down in the night time. Then there are some plants and flowers that give out their odors only in the night time, and some where there is more odor from the leaves than the flowers as in the sage. Dare we say that color and fragrance are more than the many singular behaviour of plants, for the object pointed out by Mr. Darwin is about all the good we may expect from sex in plant.

I said I would try to show you the laws which prevail in the formation of sex, which, I think, will give a better idea of the nature of sex in plants than anything I have yet given you. If you will examine any pine tree, you will find that the flowers that produce cones are the ones at the ends of the strong vigorous branches. As the tree grows, these strong branches get weak by others growing over them, and after the branches have reached and passed their maximum of vigor and strength they produce male flowers only. The male flower is immensely productive of pollen, as is seen from those showers which frequently come here from the southern States in great quantity, resembling sulphur. This pollen will tell you which the male flowers are. You will also find on examination, easily, that the vigorous portions of the tree bear the cones, and that after it has borne female flowers it is, in some measure, deprived of its nutrition—in other words, is weakened, and then produces male flowers only; but this is not until weakened. We therefore see the production of female flowers in pine trees is only on branches not weakened; in other words, it takes less nutrition to make male flowers than female flowers. By weakened nutrition the male flowers are produced. When we carry these facts into an examination of other plants, we find that similiar laws prevail. It is certain that more nutrition is required to form the female flower than the female. We find it in the chestnut. When trees are weakened by any agency then they produce only male flowers. When we have a dry season interfering with a store of nutrition, then the crop of nuts is small the next year, because the power is much weakened, and the trees require more nutrition for the formation of the female than the male flowers. [Here a number of sentences were almost entirely inaudible on account of the noise outside of the session room. In fact, throughout the whole address there was too much confusion to report any half dozen sentences with positive accuracy.] These are only illustrations of the power of nutrition in deciding the male plant or the female plant.

In the hemp, the male flower is wholly on one plant, and the female is wholly of the other. The male dies early in the season, the female exists alone, having more vital power to go on and furnish seed. I might go on and give a number of illustrations, but I think it unnecessary. The fact is demonstrated that the existence of the female, or the male sex, is simply from varying phases of nutrition. In other words, sex has nothing primarily to do with reproduction. When we understand this, we are able to reconcile differences in the observations of great men. For instance, when Mr. Darwin tried his experiments in clover—when he covered the clover from insects and it failed to produce—from his sexual stand-point he concluded it necessary that insects should bring foreign pollen. Then he went on to show a chapter of results. For instance, that the number of cats had a great deal to do with the fertilization of clover fields, because mice had a great deal to do with the eating of the honey and the bees, and without cats there would be an abundance of mice; so, as cats abound, the greater would be the number of bees, and bees are essential to the utilization of the clover plant. Then from this reasoning you may have noticed what has been written about bees in the New Zealand clover fields, and the reason why clover does not seed there; but we in this country know that clover does seed quite independent of the humblebee. You will find when the bee extracts the honey, it does not enter the mouth of the flower, but bores a hole in the side quite different from Darwin's theory would demand. Generally when there is the least difficulty, the humblebee takes honey from the outside. In fact, the fertilization of the red clover plant has bearing on the productiveness of the plant afterwards—is chiefly a question of nutrition, whether it is clover seed or not. If I am not mistaken, the second crop of clover has more seeds than the first crop, chiefly because of varied phase of nutrition has favored productiveness. The first crop absorbed all nutrition, leaving none for seed. The second crop loses some of its vegetative vigor, and reproduction is favored. A third crop would, perhaps, again be barren through defective pistils, probably giving only stamens. We find this law of nutrition in our orchards. In this country, we say this is our bearing year, and that the last year was unfruitful; but it has nothing to do with the fertilization through the aid of insects, as Mr. Darwin holds out to us. Whenever the year happens that there is not an abundance of fruit, if you will examine the English journals very closely, you will find an effort to show that the number of insects is not equal to an abundant crop of fruit; but we see that while with them it is looked upon as a question of cross-fertilization, it is, from our stand-point a question of nutrition. I made one year observations to test whether this fertilization was brought about by the bees, and it was evident that it was a question of nutrition, and in no way of insects. In fact, bees or insects seldom visit the apple blossom for its honey, but its pollen. They do not enter the flower at all, but gather the pollen from the long stamens within reach, and rarely touch the pistils. And you will find that the bee engaged in gathering pollen never gathers honey at the same time. One gathers pollen and another honey, and they are separate bees engaged at the time in that separate work. So this goes to show, not that the bees and insects produce fruitfulness, but that it is due to the presence or absence of nutrition.

There are, of course, other questions connected with fertilization which are of immense importance to the practical man, especially those questions which relate to a continuation of seed upon one piece of land for a long time. There have been some interesting experiments lately by Profesor Beal, of Lansing, Michigan, in which he treated a number of specimens of Indian corn that had been growing on the same ground for, I think, about eight or ten years. He got corn from ground which had been grown eight or ten years in one locality, and eight or ten years in other—thus planting and gathering from the same fields, and gathering again, and producing seed for eight or ten successive years. He sowed some of his grounds with corn intermixed together, and some he sowed entirely by themselves, in such a way that the different breeds would not fertilize together; and by counting the number of grains which these plants produced, he came to the conclusion that the difference was from one hundred to one hundred and fifty in favor of this crossed corn—somewhere near that—at least, there was one third difference in favor of this crossed corn. That fact is of great value. But he throws it into the scales with the theories of Mr. Darwin, as showing the necessity of continuously crossing the races. He not only goes to show that the same corn on the same ground will deteriorate, but that other plants will do so also. In other words, that the constitution is so weakened by continuation in the same ground, that it will grow weaker and weaker. That certainly goes to show, that if you mix milk and water together, you may, perhaps, have an increase in the strength of water, but why not also have a decrease in the strength of milk? You have simply brought that which is strong to the weak, and it makes the strong weak, to the disadvantage of the strong.

Then there are some facts in Mr. Beal's experiment which show that the benefits apparently are not wholly from the effects of crossing. For instance, he says, in order to prevent one row of corn receiving any but its own pollen, he cut off all the tassels of one row, and this row was the one he kept for seed. I think we all know, by cutting of the tassels of the corn we have a chance of strengthening the ear, for that gets the benefit; so I am not so sure that this crossing had anything to do with the gratifying result, as the other, with same treatment, would probably have resulted in the same way. But if in an ordinary way we can get one hundred bushels to the acre, and if, by raising crossed corn, I succeed in getting one hundred and fifty bushels to the acre, we have results that ought not to be overlooked.

His results with beans, particularly, deserve attention. He got beans grown for several years in different localities, and, acting on the theory of Mr. Darwin, that the bean cannot fertilize without the aid of insects, he concludes that the insect visiting one flower and taking the pollen of one flower that would naturally produce a black bean—to the flower that would produce a white bean, that the progeny would be neither white or black. That is what he seeks by crossing; and by doing this, and mixing in that way, the result, according to his figures, was nearly three to one, which is, indeed, wonderful. If we can raise one hundred bushels by not crossing, and can increase that result to three hundred by crossing, ought we not to do so? But the figures themselves show that there must be something wrong about it, because it is perfectly clear that by no system, whatever, would we get a threefold crop, provided that the seeds were in a first class condition. It might have been that the cross seeds were in the best possible condition, and under favorable circumstances produced one hundred bushels, when another uncrossed quantity produced only thirty bushels to the acre. It may be that the seed grown, if placed in as favorable conditions as the other, would produce one hundred bushels to the acre. We may be perfectly assured that neither crossing nor any other means will make a one hundred bushels to the acre under good conditions produce three hundred bushels. So that Professor Beal must be wrong. On increased nutrition we could understand it, but on no principle involving mere reproduction, that we can any way imagine.

It would be interesting, if we had time, to notice how pollen varies in its effects on the seeds, immediately on individuals, and its effects on progeny. For instance, we get a brown corn, white corn, and yellow corn, and grow them near each other, and we find that the pollen immediately affects the seeds; in other words, if it is crossed at all, it changes the whole character of the seed at once. We can tell at once by examining the corn of the hybridizing; but you do not find any influence at all upon other seeds. For instance, in the squash and the cucumber vine we do not find anything in the shape, but, in the taste, slightly in the form of the squash. In fact, it is well known we cannot tell, without waiting for the seed to grow, whether it is hybridized or not. In some plants we have to wait for a year or more to find whether the pollen has been affected, and then its variations are remarkable; and still more singular are the effects in this, that foreign pollen may often be applied, and seed result, and yet no change in the progeny at all. This is especially true in the lily and some other plants. Pollen has been taken from some other plant, different in color of flower and in leaf, and, using that pollen on the pistils of other plants, resulting in seeds, and not the slightest trace of hybridity seen. In other words, the pollen seems to be potent for life, but not for form. These facts show the varying influence of pollen upon flowers. There is a law of nutrition back of all questions of pollenization. It is a universal law, not confined to the kinds I have named. There are some roses very productive; some in which every flower in every plant produces seed, so that in that particular case the female element is strongly predominant, while in many other roses flowers rarely seed. The common *Wistaria*, the male or infertile element prevails. These laws of fertility or infertility often pervade whole species. Every individual will show a tendency in one direction. The hybridist should choose the least fertile for the female parent. This law has been but recently developed, but is of immense importance to the cultivator. Those species in which the female or reproductive element is strong are the least susceptible to change. The female element is the conservative element in nature.

These are some of the practical lessons which may be derived from the study of the sexes of plants. I have intended chiefly to show you that the objects of sex in animals are not those which are aimed at in the vegetable kingdom, though the laws which induce sex are, to some extent, those which we find in the animal kingdom, and that the perception of these distinct objects is of immense importance when we come to apply the facts to the every day purposes of agriculture.

Mr. KELLER, of Schuylkill. I wish to call your attention to a class of plants that produce crops without blossoming. I refer to the fig tree. How do you account for that.

Mr. MEEHAN. The fig tree has a blossom. There are hundreds of blossoms in every fig.

Mr. KELLER. Not visible to the naked eye?

Mr. MEEHAN. Visible to the naked eye. If you will cut open a fig you will find thousands of flowers in each, arranged like seeds in a rose. Cut the fruit of a rose, you will find hundreds of seeds on the inside surfaces. In the fig, it is precisely the same way. If you cut open a fig you will find the seed inside. Each of these seeds come from a little flower.

Mr. KELLER. Suppose you had two kinds of corn that blossom at the same time; one with a large cob, and the grain large; and the other kind with a small cob and small grain. Is it possible, by cutting off the tassel of the one with the large cob, that you can get a larger growth and an improved seed on the smaller one?

Mr. MEEHAN. According to Professor Beal's experiment, it is likely some immediate result would be noticed.

Mr. THOMAS J. EDGE, Secretary. Do you believe in the theory of potatoes mixing in the hill.

Mr. MEEHAN. That is one matter that I had in my mind to call your attention to, but feared to make my address too long. It is generally believed that the pollen of the white potato applied to the pistil of the red potato, will result in some red and some white potatoes. But there is no experiment that I know of directly proving this; on the other hand, similar mixed cases occur in plants which produce no flowers. For instance, there are the red sweet potatoes and the white sweet potatoes, occasionally found on the same stalk, just as we occasionally find in the Irish potatoes; and we may say, therefore, that these mixed potatoes need not necessarily have any connection whatever with the pollen. Of course, if you get red and white sweet potatoes in a plant where there is no flower, then you can take the ground that such may be in the case where there is a flower, without the pollen having any influence. In the case of beans, I have planted as many as fifteen kinds side by side, but have noted no change. But in corn it is different. There is mixing by pollen there. Each grain is immediately affected by foreign pollen. Each grain of the cross fertilized ones can be selected as soon as ripe. This shows that mixture at once in the potato is not impossible through the aid of pollen. It is simply a question of fact.

RECKLESSNESS WITH FERTILIZING SUBSTANCES.

By J. S. KELLER, *Member from Schuylkill county.*

There is probably no subject connected with agriculture, in its various branches, that is much more neglected than the materials applicable to the soil for its improvement. Not only is all that can be extracted from the soil carried to market, but even that what is not disposed of is, in many instances, grossly neglected and allowed to go to waste.

In many instances barns and barn-yards are so located that every rain carries not only the manure juices to the next stream of water, but frequently the manure itself. On some farms the straw lays scattered in every direction, the droppings of the farm fowls is allowed to go to waste while they are allowed to sleep on fences and trees, nor are the human excrements utilized for the benefit of the soil and its crops, as they should be. Even in many instances where these materials are applied, they are not used to the best advantage.

In order to use all fertilizing substances to the best advantage, the majority of American farmers have much to learn.

On all farms where horses, horned cattle, swine, and sheep are kept, the barn-yard should be well supplied with an abundance of water from a well or cistern, where running water is not accessible, and the floor of the yard should be well covered with straw, leaves, etc., to take up the droppings of animals while closed up in the yard, and, if possible, the yard should be frequently cleared and newly bedded, while that which is removed should be mixed with the manure from the stables and all should be carted in a field where it is to be used, and every layer of manure should be covered with a layer of muck or fine earth to absorb the juices and volatile portions of the manure, and hold them for the benefit of the crops to follow.

The manure of horses, cattle, swine, and sheep should be all mixed to give it uniformity.

The fowl manure, also, should be composted with muck, earth, or plaster of Paris, by which all the ammonia can be held ready for the crops.

The greatest loss, however, is that occasioned by the reckless waste of the human excrements, which are either directly deposited into streams to befoul the water, or buried out of reach. It is true that this material is disagreeable to handle; but much of the disagreeableness could be avoided by the construction of the water-closets so as to be easy of access, and their contents deoderized with gypsum, and frequently removed and mixed with its equal of clean coal ashes, fine earth, or muck, and kept under a roof or carted over the barn-yard manure, and then composted with it.

By following these rules, more than twice the quantity of manure that is now made in the ordinary way, can be made, and of a much better quality.

If a heap of manure is thus composted in a field, the ammonia will be absorbed, while the juices that are wasted in the barn-yard are taken up by the absorbents applied, and the soil where the pile is located, and its vicinity.

The reckless waste of fertilizing substances does not end here in what has been said; but other substances, such as corn-cobs, weeds, &c., are frequently to be seen cast into the public highways, and thus the farm is deprived of the vegetable mold into which their decay results. Nor are manures always properly cared for when brought on the field. Instead of being immediately plowed under the ground, they are allowed to lay on the surface for weeks, till the sun and the winds carry all the volatile portions away. I have occasionally seen a heavy dressing of barn-yard manure and freshly slacked lime put on land at the same time. The lime, of course, sets the ammonia free, and half the benefit of the manure is driven away. In conclusion, allow me to say that there is scarcely any part of farm economy so carelessly attended to as the manure.

MICROSCOPICAL FUNGI INFESTING OUR CEREALS.

By Prof. WILLIAM BARBECK, *of Philadelphia.*

I. Ergot.—In examining a rye-field about harvest time we may be pretty sure to find some plants in which, although the ears with their bracts or glumes are apparently developed in a normal way, some of the grains have attained an abnormal size and are of somewhat blackish color, (Fig. 1.) We have here what is generally known as "*Ergot*" (botanically *Claviceps purpurea*, Tul.,) a fungus which is to be found almost exclusively on rye, and which, because of its poisonous effects on animal organisms, is dreaded, particularly in those parts of Northern Europe where rye bread froms the staple daily food.

This fungus shows three distinct stages of development, two of which were well known to former botanists, but were described as separated species belonging to entirely different genera. It is to Tulasne that we owe the discovery of their immediate connection and succession.

Towards June, when the sexual parts have been differentiated, we see a mucous, honey-like substance flowing from out of the bracts of the ear. In examining this "honey-dew" (as it is called by farmers) under microscope of high power, we behold it swarming with millions of minute oval spores, or Conidia, which upon further examination we find to issue from a tender but complicated mycelium (Fig. 4) which penetrates the ovary, gradually transforming it into a soft whitish body of an oblong shape with shriveled surface, (Fig. 2.) In this form our fungus was described and recorded by Leveillé as *Spacelia segetum.*

In the course of a few weeks the gelatinous membranes of the mycelium-threads harden and assume a brownish color. Thus the originally soft tissue is transformed into a body of a corky or horny consistence, (Fig. 3.) We now have the so-called "Ergot-grain," or the second stage of development of our fungus, formerly described as *Sclerotium clavus*, Tode, and recognized as a good species among the Dermatomycetes. At the top of the "Ergot-grain" we behold the dried and shriveled remains of the *Spacelia* as a sort of hood of a dark-yellowish or brownish color, (Fig. 1*b.*)

In this form of Sclerotium the "Ergot-grains," most of which, of course, fall out of the ears when the corn is taken from the field, remain on the ground unchanged through the winter.

In April of the next year the third and very interesting form, which by its discoverer, Tulasne, has been termed *Claviceps purpurea*, is developed. We behold a number of purplish carpophores, (Fig. 8,) each ending in a yellowish head, growing out of the Sclerotium. Each of these little heads shows in longitudinal sections a row of regular shaped and arranged peridia, (Fig. 7*a.*) These peridia are filled with a number of asci (Fig. 5) containing the very minute and thread-like spores, (Fig. 6.) Direct experiments made by Prof. Kuehn, of Halle, and other mycologists, have proved beyond doubt that when these spores are sown into healthy young blossoms of rye they will in a short time prodvce the mycelium of *Sphacelia.* The same result is sure to be obtained by means of the conidia of the honey-dew, which in a comparatively short time will infect other perfectly healthy ears, and will even carry the disease over to other surrounding plants, such as several species of grass, etc.

Thus we have to regard the *Claviceps* spores as originating the disease in spring; the *Sphacelia* as propagating it during the period of fructification, and the *Sclerotium* as preserving the contagion through the winter.

It is generally known that the Ergot, when brought into human organism, operates as a nocotic poison. In certain years which were particularly favorable to its development, numerous cases of poisoning have been observed in Europe, and so we learn of a series of Ergot epidemics recorded in official European statistics. In 1771, for instance, the disease was so acute in Westphalia and Hanover that in certain villages more than ninety per cent. of the cases proved fatal.

The parasite has acquired its German name "Mutterkorn," because of its contracting effects upon the uterus, owing to which it has become an efficient aid in obstetrics, well known under the old name of *Secale cornutum.*

The Ergot in its *Sphacelia* form is, as mentioned before, not confined exclusively to rye, but its conidia infect several species of grass, such as Lolium, Bromus, Dactylis, and others. Thus a number of diseases befalling our domestic animals are most probably to be ascribed to the "honey-dew" which the animals have eaten with such infected grasses. Of course the farmer ought to remove the infected plants growing in the neighborhood of his rye fields. He ought to pick out the Ergot grains, as much

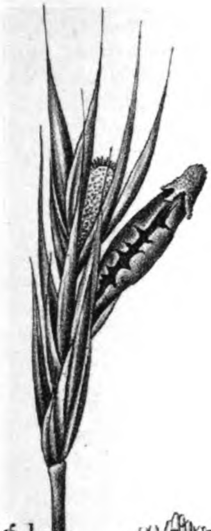


Fig.1.

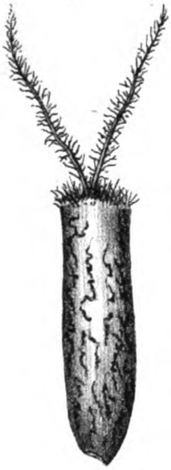


Fig.2.

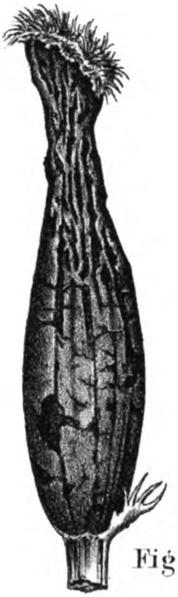


Fig.3.

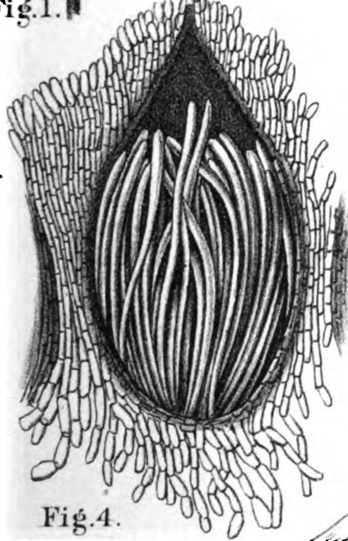


Fig.4.

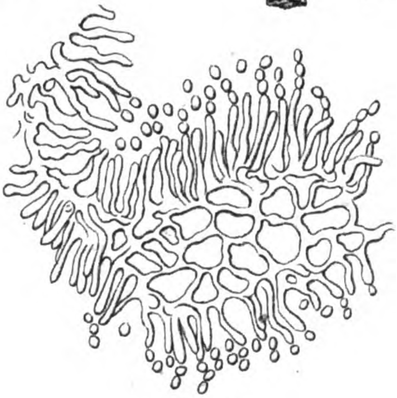


Fig.5.

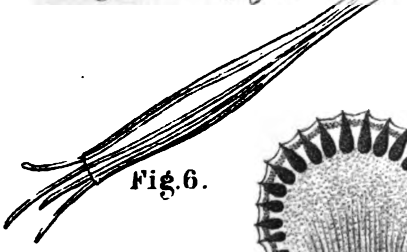


Fig.6.

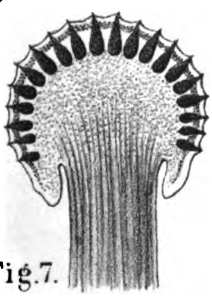


Fig.7.

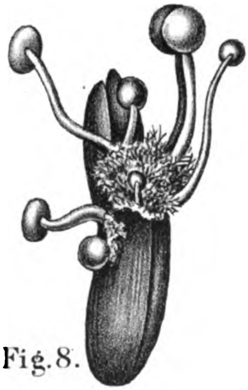


Fig.8.

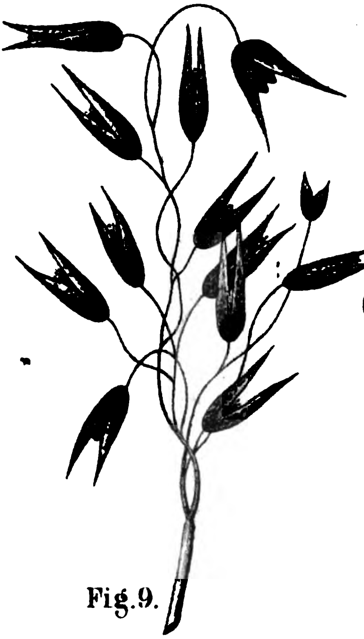


Fig. 9.

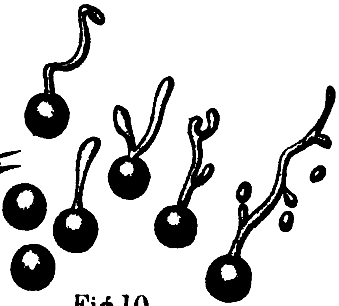


Fig. 10.

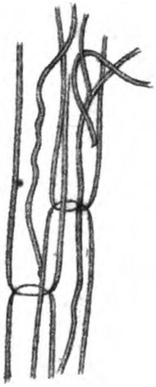


Fig. 11.

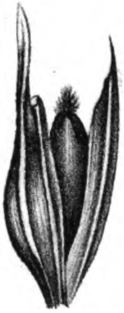


Fig 12.

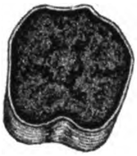


Fig. 13.

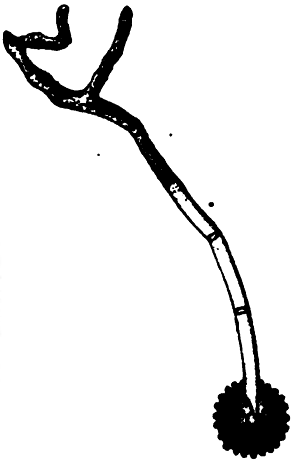


Fig. 14.

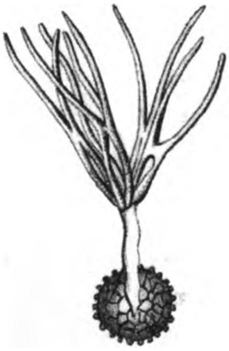


Fig. 15.

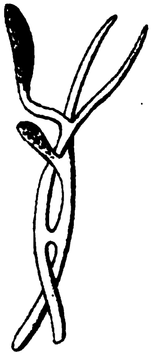


Fig. 16.

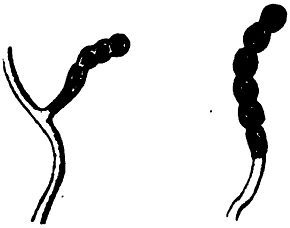


Fig. 17.

as possible, before the corn is mown, and as they are only formed during the short period of fructification, he has to apply such methods of cultivating his ground (particularly the drilling) as tend to obtain a possibly simultaneous development of the fruits, thus reducing the dangerous period to a possibly short time.

II. Smuts.—The Ustilagineæ, or Smuts, are parasitic fungi, whose fine-threaded, wide-spreading mycelium grows through large portions of the infected plants. They fructificate, however, only in certain parts of these plants and at certain periods. In such proper places the threads of the mycelium increase rapidly, resorbing the surrounding tissue. Their free ends become articulated into cells; the latter, after being separated, are surrounded by a second membrane and thus transformed into spores. These spores occupy, as a brownish dust or powder, the place of the destroyed tissue, and are set free, in a measure, as the infected parts decay.

The organs of the plant in which these fungi are fructificating vary according to the species of Smut. So we see the whole panicle of oat infected by *Ustilago carbo* or "*Oat-smut*," (Fig. 9;) the interior of the wheat grains by *Tilletia caries* or "*Bunt;*" the anthers of several sileneæ by *Ustilago antherarum*, and the female cobs of our maize by *Ustilago maydis* or *maize-smut*, (Fig. 17.) When in any of these Ustilagineæ the spores are being formed, the threads of the mycelium become dissolved and disappear; consequently when the smut is fully developed we will find nothing but the afore-mentioned spores.

Numerous experiments have shown that these spores maintain their power of germination for several years. When brought on a moist substratum they produce, within a few days, a germ tube or promycelium, on which minute sporidia of various shapes, according to the various species of smut, are formed, (Fig. 10.) According to the observations of Hoffmann, Kühn, and other eminent botanists, these sporidia penetrate the epidermis of young and tender corn-stalks, mostly in the region between the root and the first joint of the stem. The mycelium grows in an upward direction, following the course of the longitudinal cells, (Fig. 11.) However, the growth of the plant seems not to be injured; on the contrary, the infected plants are apparently of a more fresh and bluish green, and it is not before the time of fructification that the devastation becomes visible.

The process of germinating is very nearly the same in the oat nnd maize smut, whereas the "Bunt," or *Tilletia caries* shows some interesting peculiarities. In this parasite, which is to be found exclusively within wheat grains, the sporidia are produced in a verticillate manner from the germ tube, (Fig. 14.) They are repeatedly anastomose, (Fig. 15,) and this anastomosis, or conjunction, is considered as an act of fructification, for im mediately afterwards we see that oöspores, (Fig. 16*a*,) are formed, from which very minute threads are sent forth which become free and carry the disease over to other wheat plants.

It requires an experienced eye to discover the bunt in any wheat field, for the infected ears are not distinguished in their outer appearance from the healthy ones. The diseased grains, however, (Fig. 12,) when rubbed between the fingers, burst at the slightest pressure, and we see that instead of the white meal they are filled. up with a dark smutty mass, (Fig 13,) which is distinguished by a nauseous smell, resembling herring brine, produced by a volatile oil, the trimethylamine, which is also to be found in herrings.

However destructive all these smuts may be, it is within the power of any farmer, if not to prevent, at least to limit their excessive increase. The spores have been found adhering in large numbers to the grains which are harvested, and which, of course, when sown in spring, will transmit the contagion to the next crop. Now a solution of copper-vitriol, which is not hurtful to the seeds, is sure to kill the dangerous spores, and so we have an efficacious and at the same time cheap preventive remedy on hand.

III. Rusts and Brands.—The parasites of the hitherto described species we have found to be destructive to the several organs of fructification. The following fungi belong to an entirely different genus. They infest and destroy the stem as well as the leaves and vaginæ of our gramineæ and other cultivated plants, and are generally known under the name of rusts and brands, or *Uredineæ.*

In examining our corn fields in the beginning of summer, we will most likely find a number of plants covered all over with bright rusty, later in in the year with dark brownish spots and lines. These pustules are produced by parasitic fungi, which have their seat under the epidermis of the infected plants, and after being developed, burst through the epidermis in order to disseminate their spores. The very interesting development of these uredineæ is a comparatively recent discovery, the more interesting as the originators of the disease are to be found on plants belonging to families entirely different from those in which the parasites are developed.

If in May or June we examine the leaves of some Berberideæ, Rhamnaceæ, or Asperifoliaceæ growing in the neighborhood of our corn fields, (particularly those in damp localities,) we may be pretty sure to find the under surface of such leaves covered all over with little cup or jar-like bodies of a bright rusty color. These little cups are what have long since been known as *Cluster-cups*, or *Æcidium*, (Fig. 18.) They present an elegant object under the microscope and tender sections will show that the interior of the cups is crowded with basidia, from which regular rows of bright colored spores proceed, (Fig. 19*a*.) (These cluster-cups are generally attended by numbers of those strange little bodies known as Spermogonia, (Fig. 19*b*,) growing mostly from out of the opposite side of the leaf, and sending forth thread-like spermatia, the real nature of which has as yet not been ascertained.)

Prof. de Bary, in Strasburg, has been the first to show that when these Æcidium spores are brought on certain species of corn, for instance those of *Berberis*, or Barberry, on rye, they immediately begin to germinate. The tender germ tubes force their way through the stomata, and rapidly develop within the infected leaf a mycelium, from which the aforementioned spores are produced on basidia, beneath the epidermis. Prof. de Bary was led to the investigation by the pertinacious and often ridiculed assertion of old farmers that the shrubs of Barberry were injurious to rye and oats, and, indeed, his repeated direct experiments, as well as those of a number of other botanists, have proved beyond doubt that a very dangerous form of rust, the *Uredo linearis*, is produced only by the spores of Barberry cluster-cups. In the same way, it has been shown that other rust diseases, for instance such as are produced by *Uredo rubigo vera*, which also destroys our cereal plants, are originated by certain cluster-cups growing on other plants in the neighborhood of corn fields.

If we examine the rust pustules more closely, either by opening them with a needle, or by making thin sections, we will find beneath the epidermis, and growing on short peduncles, numerous yellowish spores, (Fig. 21*a*.) They represent simple oval cells, the protoplasms of which contains little drops of an orange colored oil. The hyaline episporium is granulated, and shows several translucent spots, the places from which the germ tubes will proceed. These germ tubes are rapidly developed, often within a few hours. They penetrate the stomata of other leaves, and repeat the produc-

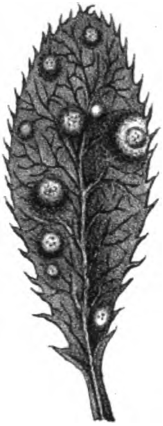


Fig. 18.

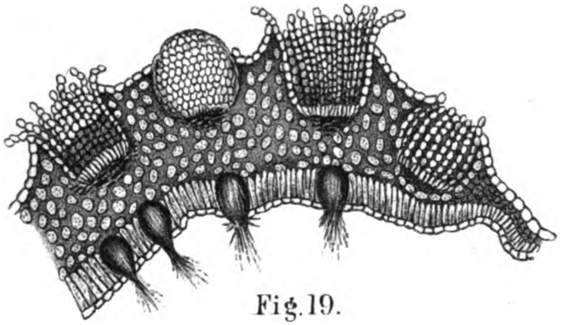


Fig. 19.

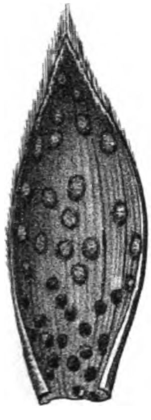


Fig. 20.

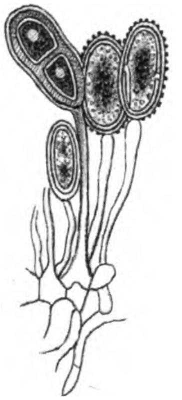


Fig. 21.

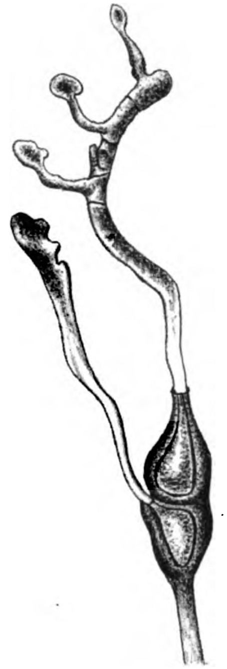


Fig. 22.

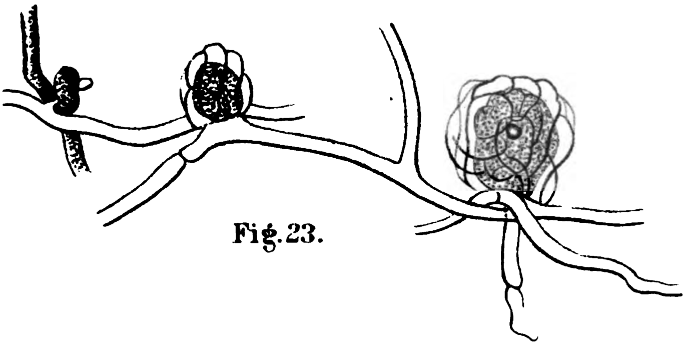


Fig. 23.

tion, first of a mycelium, then of numerous spores, which again pierce with their germs through the epidermis of other plants. In this way, the process is continued through the course of summer, and it is easily explainable that, under favorable circumstances, the disease may be propagated, from field to field, over vast tracts of land, assuming quite an epidemic character.

Towards the close of the hot season, we see our fungi entering a new stage of their development. Repeated examinations of the rusty pustules will show that the latter are gradually transformed into bodies of a dark brownish color. Let us examine these dark bodies a little closer. We will find that from the former mycelium spores of a quite different shape and color have been produced. The Uredo or summer spores have disappeared, and, in their place, we behold numerous dark brownish two-celled spores, (Fig. 21*b*,) with thick or perfectly smooth membranes growing on long pedicles. They are what is known as *Brand*, (*Puccinia*,) and were formerly described as an autonomous species of fungi. In reality, they are the winter or Teleuto spores of the rust. The spores remain with their peduncles attached to their stroma during the winter, and do not begin their germination before the following spring. Then one or several germ tubes (Fig. 22) are formed, which, at their upper extremities, become segmented into several cells, (Fig. 22*a*.) From each of these cells we see growing out a very fine thread, (Fig. 22*b*,) producing a sporidium, (Fig. 22*c*.) These sporida are set free, and are scattered by the wind, and, when brought on the leaves of Barberry, are sure to produce the cluster-cups first described. (The latter fact has again been proved by numerous direct experiments.)

Thus we see the Æcidium producing Uredo; the Uredo, Puccinia; and and the Puccinia, again Æcidium, and we have the interesting fact that fungi of an apparently unlike structure, which have been hitherto described as belonging to different genera, and which are actually to be found on entirely different plants, are in reality but successive forms of development of the same parasite.

By this discovery of De Bary the attention of a number of mycologists was directed to other species of rusts. Numerous experiments have been made, and thus the connection of a number of hitherto separated forms has been found out. We know, for instance, that one species of Uredo, *U. straminis*, which destroys the glumes and attacks the ovaries of wheat-ears, (Fig. 20,) and which, in 1862, in Denmark, caused a damage of nearly a million of dollars, has its Æcidium form on the several Boragineæ; that a disease on pear trees, destructive to the young leaves and ovaries, and known as *Rœstelia cancellata*, is the Æcidium form of a Uredo growing in early spring on Juniperus, and hitherto described as Gymnosporangium.

In some rusts the winter spores present a form at the same time very elegant and quite different from Puccinia. So we see towards the autumn the under surface of blackberry and rose leaves spotted all over with little blackish powdery tufts of the so-called blackberry-brand or Phragmidium. These tufts are composed of four or five-celled elegantly granulated spores, produced on long hyaline peduncles. In the same places where we find them now, we would have met a month ago the one-celled Uredo spores, and it is quite interesting to observe under a lens from day to day how (beginning at the circumference and moving towards the center) the dark winter-spores are gradually superseding those of Uredo. This connection has also been discovered but recently.

In the same way the dimorphism of several other rusts and brands has been defined. However, we are as yet ignorant as to the development of a good many other species, and there is consequently a vast and at the same time highly interesting field left for further investigation.

IV. Mildew.—"Mildew," says M. C. Cooke in his Parasitic Fungi, "is one of those loose terms which represent no definite idea, or a different one to different individuals." It may be so in England. American farmers, however, as well as horticulturists of my acquaintance, unanimously apply the term to several species of *Erysiphe*, and so I understand under the name of "mildew" the mycelium of a parasitic fungus which, sometimes very thin and cobweb-like, sometimes in thick, felty layer, disturbs the development of the infected plant, particularly by obstructing the stomata, perhaps also by drawing its nourishment from out of the infected organs by means of little wart-like processes, through which the mycelium is attached to the plant on which it feeds.

Among the great many varieties of *Erysiphe*, which are to be found on the leaves of different trees, as well as on a great many ornamental and useful plants, we have to deal here with one species, *E. graminis*, which in certain years is to be found in abundance, covering the leaves of the several cereals.

The real nature of this parasite has likewise but recently been discovered, and it requires a good microscope to discern the minute organs of fructification.

Soon after the formation of the "mildew" has commenced, we see some of the mycelium threads growing upwards in a vertical direction. These threads become segmented into several cells; each of these oval cells is separated in the same way as we have seen in Sphacelia, is transformed into a conidium, and by means of these conidia, the mycelium is propagated during the summer months, with incredible rapidity, under favorable conditions.

Towards the close of the period of the growth of vegetation, we see that in a quite interesting way peridia are formed by means of a sexual process. In the crossing point of two mycelium threads two cells of a somewhat unlike shape are differentiated, (Fig. 23*a.*) The larger one, issuing from the interior hypha, is club-shaped, (Fig. 23*b.*) It is (according to DeBary, to whom we are indebted for very careful investigations upon this subject) the female "ascogonium," as he terms it, against which the much thinner "pollinarium," (Fig. 23*c*,) (growing up from the interior hypha,) leans closely. The contents of the pollinarium being absorb by the female organ, the latter begins to swell or enlarge as the pollinarium disappears. In the mean time a number of secondary threads are developed at the basis of the ascogonium, (Fig. 23*d.*) These threads surround and inclose the ascogonium, producing numerous lateral as well as inward growing ramifications. The lateral threads weave themselves into a compact tissue, (Fig. 23*f*,) which afterwards hardens, becomes brownish and forms the outer coat of a peridium, while the space between this coat and the ascogonium is filled up by the loose tissue of the inner ramifications.

The ascogonium is divided by repeated partition into a number of asci, each of which in our species contains eight spores. According to the observations of several botanists, these spores are not developed before the next spring, so that the parasite is preserved through the winter by means of the peridia. In most species of *Erysiphe* these peridia are provided with hyaline appendages, some of which are of wonderful regularity and elegance of form, when seen under the microscope.

W. W. **PARKER**, of Chester. Will the professor inform us what the so-called "honey dew" is.

Prof. **BARBECK**. It is a cloud that you observe just about this time. Of course, not so common in this country; but very common in Europe. It is just out of these, [describing on diagram.] You can taste it, and the taste is sweetish. If you examine it with a microscope, you will find it swarming with spores. In these smuts which we have here, the maize or corn, when harvested and taken home, have been found to contain numerous spores attached to them, and, consequently, the disease carried over to the next crop. It has been observed that a solution of copperas, which is not at all hurtful to the corn, will be found an efficacious remedy.

The **SECRETARY.** It has long been a theory with practical farmers in England, and on the continent, that the disease of the barberry bush, known as "smut," and the disease in wheat known by the same name, were, in some mysterous way, connected; and that a barberry bush thus diseased, and standing in an adjoining hedge-row, would communicate the disease to the wheat. Is it not a fact, now well known to scientists, that the smut of the barberry and the smut of the wheat are one and the same disease, and that the spores of one will produce the disease in the other.

Prof. **BARBECK.** Yes, sir; if you take the smut spores from the barberry, and sprinkle them over rye or wheat, you will produce a smut in wheat. It has also been found that the same is true of the smut spores from borage.

Mr. **BEEBE.** In connection with the professor's essay, I would like to inquire whether he has investigated sufficiently to give his opinion as to the various remedies in use in Germany to prevent or eradicate these diseases.

Mr. **BARBECK.** A solution of copperas and lime would prevent; also, the hewing down of those parts that produce or originate these pests.

Mr. **BEEBE.** I have heard of those remedies. My idea was to get more.

Mr. **BARBECK.** Another idea is that drilling reduces them.

The **PRESIDENT**, *pro tem.* If not prevented or looked after, will these things spread rapidly in wheat?

Mr. **BARBECK.** Yes, sir; they are very rapidly propagated. If you examine under a microscope, you have hundreds and hundreds of these spores. They are scattered by the rain and wind, and immediately after they strike a plant they drive their semen through so as to infect it.

Mr. **THOMAS MEEHAN**, of Germantown. It is proper to know that nature herself helps to prevent the spread of these things; for instance, this fungus. We go through a meadow, see a puff-ball, and give it a kick, and spread the millions of spores in all directions. A year after that we may go through that locality and yet find puff-balls very scarce. I think that is the experience of those who have studied in regard to other species of fungi; that is, that nature prevents, in some mysterious way, the spreading of these spores, and requires very nice conditions for their germination. For instance, the mushroom, in which case it is said the spores never germinate unless they pass through an animal, as the horse. An effort has been made to raise them on glass, and a Frenchman has recently declared, from experiment, that the spores never propagate of themselves until they have passed through an animal. It is usually increased by "spawn," a cobweb-like material, which is carried somewhere else and enables it to grow. I think fungi is propagated more by myceleum or spawn than in any other way; so that we need not necessarily destroy or burn these crops that have fungus on them to prevent its germinating. You know in cedar trees one will sometimes notice large fungoid masses, and you will see this jelly-like matter developed in the course of an hour after a very warm rain. Then, again for years you may pass the trees, and not find a vestige of it. You remember the particular fungus that produced the horse disease called the "Epizootic," for it has been traced to a fungus called *aspergillus*; and yet those who have examined the spores of that fungus report that they can be caught at any time; but they find that it requires peculiar conditions to develop them. When the nice conditions are favorable they germinate, when epizooty will travel perhaps a hundred miles per day. We ought to be thankful that these myriad millions of spores are seldom developed, and that generally they remain dormant without doing injury. Usually, we see the buttonwood very much affected, and the affection has been traced to a minute fungus that this year has been entirely harmless in connection with that tree; and the next year they will likely, by some mysterious process of nature, grow again, and then be entirely harmless again; so that these peculiar means of preventing disease, made use of by nature herself, are almost as potent as if carefully carried on by us alone. She is at once our foe, and yet our great defender.

THE DAIRY INTERESTS OF PENNSYLVANIA.

By L. S. HARDIN, *of New York.*

I have taken it into my head to give you a sketch of the impressions I have formed concerning the dairy interests of Pennsylvania, as received from the beliefs of those who reside beyond the boundaries of the Keystone State. These impressions are, of course, not built upon closely studied statistics, nor even the cautious gleanings from a well-conducted and intelligent correspondence with dairymen and dealers in dairy products in Pennsylvania. They are, therefore, not altogether reliable.

There is, however, not only a pleasure, but a very decided profit often in having an opportunity to see ourselves as others see us. If their impressions be correct, and flatter us, we can take great comfort to ourselves in knowing how much better we are than our neighbors. If, on the contrary, they abuse and spitefully use us, we can console ourselves with the philosophic comfort that it is not true, and nobody respects their opinions anyhow. If, however, they not only abuse us, but tell the truth too, we can then thank our stars that we have so good an opportunity to amend our ways. With these few suggestions as to the way my impressions may be treated, I will proceed to tell you what I have heard, seen, and believe in regard to the dairy interests in this State past, present, and to come.

It is said that a stranger being once struck with the strong national and local prejudice of his English friend, asked him to draw upon paper a design of his ideas of the geography of the earth. The Englishman immediately drew a small circle. "That," says he, "is the earth." Outside of and around this, he drew a larger circle. "That," says he, "is England." Outside of and around both circles, he drew another. "That," says he, "is the county I live in." So it is with the reputation of your butter. Pennsylvania, the State, represents but a small circle. The reputation that surrounds you encircles you; that has kept your name bright in the annals of the dairy; that tradition loves to con over, and tell the story of former greatness, is, 'Philadelphia butter."

As far back as I can recollect, no matter what part of the earth I met an

American in, if the question of good butter came up, and my companion considered himself as having traveled, he would describe in glowing terms the surpassing excellence of Philadelphia butter. Strange and varied were the causes attributed to the favored spot for the excellence of its product. The uninitiated taking their cue from its name—vaguely supposed the butter was made in the city of Philadelphia by some manufacturing process that had superseded the old factor, the cow, just as some Philadelphia butter is now made and sold under the more modest name of oleomargarine. Others, however, better posted, had seen the rich green fields and purling, pebbly-bottomed brooks and clear, cold springs of Chester and other adjacent counties, and as taught by the butter expounders of those days that these were absolutely requisite to the manufacture of good butter, they jumped from effect to cause, and attributed all the glory of this famous brand to these favorable conditions. There were still other factors in the race, however, and they were not entirely overlooked by those who occasionally drew pen pictures of this dairy district. There was an abiding and scrupulous neatness about the whole process of manufacture here that had not made itself so prominently conspicuous in other dairy districts. It is well known that cleanliness is even greater than godliness in butter making. It will be borne in mind that this district was settled in those days largely by Quakers, with whom cleanliness seemed to be an article of faith. It needs but a suggestion for the picture to appear before you of nicely-combed hair and cleanly-shaven faces of the men, the circumscribed and spotless purity of the women's dresses—all suggestive of, and a true index to the neatness that governed anything pertaining to the farm.

In this good rule was, of course, included, even to an exaggerated degree, the management of all the operations of the dairy. Be it butter or be it cheese, the good housewife would tolerate no intrusion of slovenliness upon the immaculate purity of her tins and towels. The art of scrubbing was carried to such an extent that it came near breaking the backs of all the women in eastern Pennsylvania. Such devotion to a single purpose of course received its reward. Far and near the reputation of Philadelphia butter spread itself, and men in distant lands believed that all the citizens of this city buttered their biscuits, and that even the cooks greased their platters, with butter at a dollar a pound.

There was, of course, a slight exaggeration about this. Tradition, even in its purest form, is liable at times to take on excessive proportions. But that dollar-a-pound belief has been of immense service to the dairy interests of our country. It has been the leading star, the object of emulation, to all the benighted butter-makers throughout the length and breadth of the land. No matter if their butter did sell for only ten cents a pound, they consoled themselves with the thought that they belonged to an honorable profession, because some butter sold for a dollar a pound, and there was no telling what day they too might rise to eminence.

We have thus taken a peep into the past—a circumscribed review of the early reputation of Philadelphia butter. In regard to butter and cheese from other parts of the State, I believe their reputation was as good as the make of any other State, though I cannot recall any striking or prominent reputation attached to them. In fact, the dairy products of the whole country possessed but a common reputation, there being no effort to greatly improve the products until the factory system was introduced This aroused a spirit of competition that is now rapidly carrying the quality of our dairy products forward to the highest state of excellence. It is in contrast with this factory product that we must now measure the quality of Philadelphia butter. While there is no reason to believe that Philadelphia butter has deteriorated in quality, it has lost much of its prominence on account of the great excellence of many rival brands.

Dairy prints, owing to the infinite variety of its grades of quality, will always stand at a great disadvantage with the organized methods followed in making factory butter. It is thus that the western creameries are playing such havoc with the premiums at our dairy shows—robbing dairy prints of all their former glory. In this light the State of Pennsylvania can take to its consolation the fact that as the name of Philadelphia recedes from our view the name Meadville arises with a more resplendent glory. Here we find not a scattered, disconnected, and often contentious community of single-handed butter-makers, but the spirit of order, the power of organization is making itself felt, and by united action the dairymen of western Pennsylvania are putting themselves in order to make a strong and successful fight with their dangerous rivals of the west for possession of the dairy markets of the world. The dairymen of eastern Pennsylvania should take this subject under careful consideration, and profit by the example their Meadville allies are setting them. State pride and personal profit in this respect go hand in hand.

While your State brand of butter and cheese has no great prominence at present in the markets, you have a most encouraging prospect ahead of you. You have a State as broad as an easter empire. The soil represents all the varied wealth that agriculture can demand. Your climate is a happy medium that responds kindly to all the demands of the dairy. But, over and above all, there is no State in the Union where the art of agriculture, either in its practice or its science, has reached so prominent a point as it has here. Your spirit of investigation is indomitable, and while many of us complain and sometimes even howl at your conclusions or your methods of procedure, it is to be hoped you will press right onward in the good work.

Allow me to congratulate you on the fact that so far no jealous bickerings have developed themselves here. They are the vampires that have thus far sucked the life-blood out of many of the most promising agricultural enterprises in the country.

It is to be hoped that your officers will continue that spirit of enterprise and investigation that has thus far marked their course with such gratifying results. May you bring them a united and vigorous support, to the end that all of us in the future may reap the rich harvests of well authenticated facts that you have so generously furnished in the past.

The SECRETARY. Will Mr. Hardin give us his views upon the comparative merits and advantages of deep and shallow setting for cream?

Mr. L. S. HARDIN. In regard to deep and shallow setting, I take it our principles of butter dairying are divided into those two branches. One may be called the old-fashioned, shallow-pan system, and the other the new-fangled deep-pan ideas. It is perfectly wonderful the infinite amount of varieties in which the shallow-pan system is pursued. If you take a man making butter in Kentucky, and another in Illinois, and another in Vermont, they will resemble each other about as closely as three men working side by side in Pennsylvania, or Vermont, or Ohio. They all have their own systems. They each may use the same pans; they frequently use the same pattern of churn, and many of them sit on the same kind of cow-stool. Each one goes on his own plan, thinking he has the best method of making butter that has been invented. Boiling these down, I have come to the conclusion that the butter makers in Chautauqua, New York, are the most finished butter makers known. I have fought them, and have come as near being whipped as I want to be. They required but twenty-one and one half pounds milk to make a pound of butter, with common cows in midsummer, when the thermometer was bouncing between seventy-five and one hundred. Each pan was large enough to hold a whole milking—the milk about two and a half inches deep. These pans, instead of being set down in a back cellar, where the air is always more or less moist, were set in a room as high as this. They didn't care about the heat; in fact, after you get above sixty it doesn't matter, until you get above ninety. When they set the milk, they don't seem to care whether it sours or not. They put it into these pans, with two or three cups of sour milk to hasten the souring. They do not get more cream by it that I know of. They don't skim the milk until it begins to clabber at the bottom. They will stay up all night to watch. They are close calculating people, and get every pound of butter there is. They take care of forty to fifty cows, and from them they get three hundred to three hundred and fifty pounds of butter a year per cow, and they are common, every-day, native cows. I think, if they made the same quality as is made here, they would make more money than any banker. I do not think they know more about churning than anybody else. The use the old-fashioned churn, and some of them the barrel. They test the temperature with the finger, and go through the old rule that everybody else does; but they get more cream from the milk than any other dairymen in the country. That is all I know about shallow setting. It would take me a month to tell you all I know about deep setting. The deep setting plan was started here some few years ago on wrong principles, and Colonel Warring was the chief advocate of the plan. They set the milk too warm. I think the setting should be twenty inches deep, and three inches in diameter. Everybody imagines that water is colder than air, because it takes the heat out of the hand quickly; they imagine that water runs down to forty degrees in the summer; they think there is nothing as cold as that; but always take those hard-fisted thermometers, that will always tell the true temperature of the air and water, and you can tell in no other way, for their temper, unlike yours, is, at all times, perfectly cool. If one is not hurried, and keeps cool, he can, possibly, make easy going guesses; but, if he gets flustered, the temperature rises, and everything goes to smash. Better go to the old thermometer, who has no sentiments on the subject, and, if you give him a chance, he will tell you exactly what is going on. When you get above fifty, you are certainly dealing with temperature that is not profitable with deep setting milk. It depends entirely upon the coldness with which you carry it. In order to get down to the best work, my idea is below forty degrees. Unless you do, you cannot get all the cream from your milk. The colder you set it, the quicker the milk will come, and, if you get it below forty, the better. You can thus have milk that is sweet, and that you can feed to the babies, and it is much more profitable to feed them and the old folks with sweet milk, than the pigs with sour. I am positive of the excellent quality of butter made from sweet cream. The trouble is we are not specific enough in our business. We scatter all over. Cream, in the hands of the average butter maker, when churned sweet, will make better butter, and longer keeping butter; but I acknowledge, when people become thoroughly skilled, they can make about as good butter with sour cream as under other circumstances. That is a question for you to decide, and you had better not consider yourself talented on that point. Come to the easiest results, and the quickest. If you will introduce the cold and deep system, you will get more butter, longer keeping butter, and infinitely better butter than by any other process. Keeping butter has been the ruin of butter makers. What the effect has been in Pennsylvania, I don't know; but we find that a few years ago Orange county butter was the primest in market. Now, western butter is quoted higher, because eastern butter makers thought their's couldn't spoil, and held it back. These parties from Elgin have it made, sent forward, and it is on the table of the consumer as soon as they need it. Consequently, their butter being fresh, and rosy, and well made, has become a choice butter in the market. Let us get to market our bright, fresh, rosy butter, and have it eaten up, and they will send for more.

Mr. J. F. **CROWLEY**, of Mexico. How long can butter be kept?

Mr. **HARDIN**. I suppose it is presuming that you are making a tip top article to begin with?

Mr. **CROWLEY**. In our part of the country we do not get butter until after it has been made sometime—for nine or ten months. Can it be kept for months?

Mr. **HARDIN**. No, sir.

Mr. **CROWLEY**. In the part of Mexico where I have been residing, about three months we get butter, and for nine months we have none, except what is imported. How would you recommend that we do there?

Mr. **HARDIN**. I think the Spaniards have solved that by using olive oil. That is a great deal better than rancid butter. I have seen this canned butter from Sweden that they send down to Brazil, and get a couple of dollars per pound for. We had it on exhibition at the National Dairy Fair. It is our butter with the taste taken out of it. It is simply first-class lard.

Mr. **CROWLEY**. In Mexico, fifteen hundred miles inward from the sea coast, we do not find many Pennsylvanians. We may find a few New Yorkers, but none from this State.

Mr. **HARDIN**. Take the principles of butter making, and you can apply them as you please. A first-class article of butter, if you will put it in a temperature below fifty-five, it will keep better. I do not like the taste of cotton cloth in the butter. In fact, I am high toned. Put it in a tin bucket, and tie a closely fitting cover on that, and then put the whole in water below fifty-five degrees, and I can keep it forty or fifty days in a way that will suit my appetite. But if it comes out into a temperature like this (thermometer about ninety) for three or four days, somebody else can have it. I think it is profitable to make the best butter.

Mr. **BEEBE**, of Venango. Would it not be a good idea to send oleomargarine to Mexico?

Mr. **CROWLEY**. I came here to-day to listen to a gentleman in regard to the manufacture of sugar, but I was a little too late. I was in the State of Chihuahua. The first churn made there was by a man from Kentucky, and, in addition to the churn, he had a cow. Previous to that, they used to make butter in a wooden dish, and take their hands to work it. They would put cream into the dish, and rub their hands in until they got it half mixed and scummy, and then they called it butter. Mr. Smith made the churn, and made presentable butter, and got $1 50 a pound for it.

Mr. **BEEBE**. Mr. Hardin has gone but half way on the deep and shallow setting, and the various methods of making butter. I now move that he give us his views of the working and salting of butter.

Mr. **HARDIN**. I am glad to do anything I can in that line. In regard to the first, let us take the cream. My notion is that cream will not churn profitably—that is, you cannot get the largest average yield from cream until from eight to twelve hours after it is taken from the milk. Why it is, I do not know—may be the agricultural colleges can tell us—but in churning I would not use cream until after eight hours old. So far as the churning of sweet and sour cream is concerned, may be an open question as to the amount of butter yield. I have tried it repeatedly with a series of experiments; that is, I have weighed my cream and then weighed the butter result—for eight, and ten, and twelve churnings, one right after the other, every other one sweet and every other one sour. Sometimes there would be a great variation one way and sometimes another, and it would zigzag so it was pretty hard to determine, but I found, on the average result of the yield, the sweet cream was a little ahead, but not worth quarreling about. Say we take sour cream, watch the temperature and depend on the thermometer; if you depend upon individuals and upon their state of feeling, without regard to the thermometer, it is going to run away from you. Take your can just the instant you strike the right temperature. You have to watch it very closely that your temperature is correct. When I impress this on my assistants, they make sure of those results. I have never had trouble after that. Bring your cream between fifty-eight and sixty-five. As to the churn, these double-acting, lightning churns I do not approve of. If you get a very convenient, easy-working churn, you will find that the amount of butter is not the same as when there has been work used in producing it. It requires so much hard labor to get the butter out of the cream. If you take a barrel and let it slip around easily you lose about ten or twenty per cent. of butter out of it. You must have a churn that works pretty hard, and you will be more sure of the best results. As soon as the butter comes to the size of canary bird seed, I like to cool it with a little water. If you put in water at a temperature of sixty degrees that hardens it up somewhat. Then I draw off the buttermilk, and keep drawing off, from time to time, until the water runs clear. I like the butter workers that are manufactured here very well indeed. I first put in my salt and work it a little, and then let it stand six hours before re-working and printing. As to the proportion of salt, it depends on the market taste entirely. For Chicago, put in an ounce of salt for a pound of butter; in Kentucky, a third of an ounce to the pound.

There is a nice way of doing these things. There is nothing so much as in the style of your packages. It is well to put the pound packages up in nice, clean, white cloths, that you can give away. You can get muslin for a cent or two cents per yard, and that little extra cost will pay you back wonderfully. It will not pay you back just to the cent, but it will pay in increased reputation; and everything you can do in this way will bring you customers. As long as you take to market butter which can be found just as good anywhere else, they will turn up their noses at your price if a trifle higher than others; or if you sell as low as others, they will still hold you down to the hardest kind of work. Make good butter, and go the top of the trade, and if you cannot stay there you had better get out of the butter business.

M. **Keller**, of Schuylkill. Can you get enough after the first churning to pay for churning a second time? Butter will sometimes come a second time, and sometimes it will come easy.

Mr. **Hardin**. This is one of the disputed questions of the butter dairy. My opinion is, where that happens is when you mix the new milk with the old cream. It may be that some of these lightening churns will make butter out of that which has once been used. If there are any globules left, this state of things can happen. With those in my employ, I do not allow them to deviate any from my line of action, consequently, we do not carry out the idea inquired about. As to the question, if you go into these anomalous issues, there is no telling where they will lead you. I cannot tell you about butter coming as you say. If you will show me your plan, I might point out another way, with some suggestions for avoiding your trouble.

Dr. **FRANK TAYLOR**, of Chester. Good dairying is very valuable. The civilization of the people is estimated by the character of the butter they make. One of the most important duties of the agriculturist is to teach to those under him how to make good butter. I think we owe to William Penn what we have in the way of industry and honesty in the way of good butter-making in this section. I think our friend will find, on examination through this country, that good butter-making is an every day occurrence, and what he said on the subject of good butter-making in Pennsylvania has been truthful, and the praise he has accorded has been in the right direction. The only thing that I had any exception to is that in parts of Crawford county they make as good butter as around Philadelphia. Yet I remember that this Board met in Crawford county last fall, and the chairman (Mr. Foresman) and myself abstained from butter for two days and two nights, because we could not get anything but oleomargarine. We were not able to discover the good butter there. We trust the next time we will be able to find it out.

It is not for us to discuss the question here to-day in regard to the methods of Chautauqua or Orange county, whatever they may be. It is sufficient for us to know that we still make here good butter. I trust all the other portions of the land will learn from us, if they do not make good butter. As to Mexico, any man who leaves a country like this to live there deserves to have bad butter for more than nine months in the year. But that has nothing to do with the sale of butter at home. The speaker seems to be very much determined that we should buy the deep pans. If there is no personal interest in this matter—if this gentleman gives us this advice out of pure benevolence—then, I suppose, that possibly, his advice ought to be taken. But those shrewd fellows up in Chatauqua county seem to manage very well by the other plan. I am inclined to think that this company having this splended exhibition building, in which we are now assembled, ought to take this great question, which concerns the welfare of the people, and have this subject up to determine this one of the most useful of the arts. I am interested, like all the rest of you, in having good butter. If you do not have good butter in the morning, and good bread, most likely you will have a bad temper the rest of the day. Much depends upon our peace and welfare as a people in the making of good or bad butter.

Mr. **BEEBE**, of Venango. During the reading of the paper by the professor, when he spoke of Meadville I saw the eye of my friend twinkle, and I knew what was coming, for Quaker, as he is, he has his local pride like the rest; and when the speaker mentioned Meadville, I saw the old Adam in the gentleman who has just taken his seat, and anticipated what was coming. Now with the Quaker system of order and sobriety, I suppose there is enough left even down in Chester county, whereby a man may be able to form an opinion disinterestedly, and without prejudice. I do not know whether the people prevent any such thing in Chester or not; but I know the man in Titusville, who had the money, secured the location and built the public house referred to, and building the largest house would naturally get the best customers. Our hotel keeper had the money, and secured the location and built the principal house; but it was either his avarice or his system of economy that caused him to deal in impure butter, and give our friends a poor opinion of our products. Had the elements been propitious I could have taken the gentleman to the little village of Pleasantville, near which I live, and convinced him otherwise, than what he said to-day from, doubtless, honest conviction. Had it not been for the successive rains, I think, we would have successfully exhibited our skill in attempting to imitate Chester county butter.

I notice in the inquiry of our friend from Mexico, (Mr. Crowley,) something that I should suppose would have been taken in account; for the commercial man would have considered it an opportunity to extend his traffic. I have no doubt that the gentleman's condition is such that he has found it best for him to be in that far off country, and that his purpose was to endeavor to ascertain in reference to the keeping of butter, and making it marketable product when transported to Mexico, and used there; yet, with his uniformly courteous questions, I must say he has not succeeded in eliciting a word in reply. I trust, if there is any gentleman present who is familiar with the butter business, that he will give the desired information. I do not suppose our captains on long sea voyages deprive themselves of butter, and if this inquiry can be answered it ought to be by all means. I think I have read somewhere of methods of securing and packing butter, and that the author declared that butter packed according to his process would keep two years.

Mr. L. S. **HARDIN.** They use olive oil instead of butter in hot climates. It is better than any butter that ever was found, or that ever will be found in that part of the world. If you put butter in cans the cans will burst, because it gets stronger than the cans themselves.

Mr. **PARKER.** I wish to ask the gentleman to fill up one blank that I think he left open. He spoke of churning sweet cream in the manufacture of butter, and would recommend it to be in that condition eight hours before churning; but he failed to fix the temperature of that cream during those eight hours. I think practical butter makers would object to this system. They have practically tested the manufacture out of sweet and ripened cream, and the butter makers who furnish the gilt edge butter prefer the cream that is sour or ripened. They do not pretend to go into the scientific reasons for it, but that is demonstrated practically to them after long years of experience. I would like to know the temperature of that cream that should stand so many hours.

Mr. **HARDIN.** I would have it above sixty, and allow it to ripen between sixty and eighty—along there—if longer, then the colder the better. In regard to the gilt edge butter made out of sour cream I think I would put against it the Elgin butter, made with sweet cream. It is, I think, the best butter made now, and it is not made by my process.

Mr. **SAMUEL J. LEVICK.** I am abundantly satisfied that a large trade might be developed with Mexico and other countries, if our chemists would develop a process for retaining the flavor of our butter a long time. It is left to the growth of the nineteenth century to make that development for us. I remember turning my attention to this subject, and I heard of a process by a gentleman where he was enabled to make and, I believe, preserve butter in a degree of sweetness that would reach the Mexican country now. I am satisfied, if the article of butter can be sent abroad and preserved sweet, it would open up a large and important trade. I think it should not be lightly passed over. If butter would not satisfy the first speaker when made longer than four or five days, some of us know that we have had good butter kept four or five weeks, and longer even than that. I believe we could reach out, from what has been said here to-day, and extend our trade not only in the way of butter but in the manufacture of sugar.

THE LUNG PLAGUE,

(CONTAGIOUS PLEURO-PNEUMONIA.)

BY THE SPECIAL AGENT OF THE GOVERNOR.

For several years past there has been a growing desire upon the part of the stock breeders and stock owners of the State, that, if possible, something might be done to prevent, or at least mitigate the losses they have each year experienced from the disease known as pleuro-pneumonia. At meetings of our farm clubs and granges, the subject was discussed and committees appointed to take it into consideration and report.

The immense loss which must result from the infection of the large herds of the West and Southwest, was plainly pointed out. It was shown that England, with only six million animals, had lost more than $500,000,000 by this disease since its introduction from Holland, and that, in the same ratio, the introduction of the disease among our twenty-eight million cattle, would cause a loss of $2,000,000,000 in an equal time. That in our own State, the loss would, in a short time, seriously impair an important interest, and would prove eminently more fatal in the West, where all interests are more or less intimately connected with that of stock raising, and where all interests thrive or languish in sympathy with it.

Massachusetts, by prompt and vigorous action, eradicated the disease from her borders, and last year expended less than fifty dollars for this purpose. It is true that the struggle cost her nearly $68,000, but her stock-owners well know that an immunity from the disease was cheaply purchased at this price. The disease had insidiously crept from dairy to dairy, from farm to farm, and from one stock-yard to another, until four of the leading dairy counties of the eastern portion of our State were infected. In these counties the entrance of the disease into a herd was considered as tantamount to a loss of from twenty to fifty per cent., and sometimes exceeded even the latter rate. Dairies were broken up, the business abandoned, and, in many cases, the surviving animals sold and scattered, thus forming centers of further contagion. All practical men admitted the presence of the disease. Our agricultural papers discussed its spread and its probable results. Our veterinary surgeons had, in a measure, become familiar with it, and most of them recognized the fact that treatment was of but little avail. With the disease a matter of comment in our daily papers, it was not at all surprising that the British Government, whose farmers had lost millions by this and similar imported diseases, and had spent immense sums in attempts to stamp out this very disease, should direct its attention to the presence of the disease here, and the possibility of the infection being conveyed by cattle imported into English ports. The agents of the British Government, accompanied by competent veterinary surgeons, who were familiar with the disease during its ravages in England, starting from Canada, found it in all the Atlantic States, from Massachusetts to Carolina, and, reporting its presence to the home Government, a quarantine was ordered on all American cattle. They failed to recognize the fact that the cattle thus imported did not come from infected districts, and that they did not come in contact with infected cattle; but, finding *supposed* cases of contagious lung plague (pleuro-pneumonia) in the cargo of the Ontario, at once issued the edict which practically stopped the importation of live American cattle, at least, for a time. It is now rendered very probable, if not almost certain, that the stock in the Ontario were only affected with common or sporadic pneumonia, caused by injuries sustained by the vessel during a severe storm, and the consequent drenching with cold sea water, which the cattle afterwards sustained; yet this furnished the needed excuse, and had not this been found, another would have soon taken its place. Whether this action of the British Government was due to a desire to protect British cattle or arose from a fear of competition, rather than contagion, it is not for us to discuss, but such are the facts of the case.

A number of our best veterinary surgeons and most enterprising cattle breeders and dealers had, for a long time, been anxious that our national Government should quarantine *all* imported cattle; and, if possible, by this inexpensive precaution, prevent the introduction among our stock the much-feared rinderpest, foot and mouth disease, or the many other contagious diseases to which the horned stock of Europe are liable; but their advice and request has not met with appreciative action on the part of the general Government, until after the passage of such an act would assume the appearance of retaliation, and, of course, came to late to have any effect upon the disease which we have under consideration.

By legislative action, the State of Massachusetts had, at least four years before, not only admitted the existence of the disease, but had, also, by legislation, decreed an attempt to eradicate it by what has been styled the "stamping out process;" and, after a few years of active work, the sought for result has been attained, and the State, except from cases brought in from neighboring States, has been pronounced clear from the disease. Connecticut, New York, and New Jersey, by similar legislative enactments, had also recognized the disease in an official way, and had made appropriations and passed laws necessary for its attempted eradication, on a plan similar to that adopted by Massachusetts, and had asked the coöperation of Pennsylvania in a common and concerted attempt to accomplish this purpose, and, if possible, prevent the further progress of the disease westward.

At this stage of the proceedings, the worst injury which could be inflicted upon our export trade in live stock had its effect, and the shipments in live cattle had practically stopped on account of quarantine regulations. The farmers of our State were aroused to the imminent danger resulting from the permanent location of the disease in this country. Several States, for mutual help and protection, had joined in an endeavor to stay the pest, and the assistance of our State was asked. Our past losses were estimated at from $500,000 to $750,000, and good judges placed the amount even higher, and it was impossible to estimate the loss, if nothing was done to prevent its further spread.

Legislation and its Results.

Recognizing all these facts, and being in possession of many more which might be enumerated, a meeting of dairymen of Delaware, Montgomery, and adjoining counties, held in Philadelphia, early in March, appointed a committee to wait upon the Secretary of the Board of Agriculture, and urge the importance of legislative action. The veterniary surgeon of the Board, with this committee, visited herds supposed to be infected. Veterniary surgeons who had had years of experience with the disease in England, were called in; post mortem examinations were made, and the existence of the disease established beyond a reasonable doubt.

The Legislature being then in session, the Secretary of the Board of Agriculture laid all the evidence before the joint Committee of Agriculture of both Houses, consisting, on the part of the Senate, of Senators St. Clair, Seamans, Kauffman, Roberts, Craig, Ross, and Beidelman, and on the part of the House of Representatives, of Messrs. Kincaid, Matlack, Greenawalt, Magill, Ackerly, Miller, Stephens, Hill, McConnell, Landis, Walker, Burton, Eberly, Fullerton, Lowing, Nichols, Bowman, Hallowell, Schaeffer, Davis, Fabel, Gammell, Newbaker, Eldred, and Morris.

After discussion, this committee decided that it would be proper that the State should adopt a line of precautionary and preventive action not only for the benefit of its own citizens, but also out of respect to the action of adjoining States, and a sub-committee was appointed to consult with the Governor, and, if deemed expedient, prepare a draft of an act providing for the desired action. After consultation, the following resolution was offered by Senator Kauffman, and adopted by both branches of the Legislature:

"WHEREAS, The States of New York and New Jersey, by recently enacted laws to prevent the dissemination among live stock of the disease known as pleuro-pneumonia, now invite this State, by a concert of action, to assist them to eradicate this contagion; therefore

"*Resolved by the Senate*, (if the House of Representatives concur,) That the Governor be and is hereby authorized to take such prelimary action as may be necessary to prevent its further spread."

This resolution was approved by the Governor March 27, 1879.

At the same time the draft of the act, as adopted by the committee, was introduced by Senator Kauffman, and after amendment, passed both branches, and was approved by the Governor May 1, 1879:

AN ACT

To prevent the spread of contagious or infectious pleuro-pneumonia among the cattle in this State.

SECTION 1. *Be it enacted, &c.*, That whenever it shall be brought to the notice of the Governor of this State that the disease known as contagious or infectious pleuro-pneumonia exist among the cattle in any of the counties in this State, it shall be his duty to take measures to promptly suppress the disease and prevent it from spreading.

SECTION 2. That for such purpose, the Governor shall have power and he is hereby authorized to issue his proclamation, stating that the said infectious or contagious disease exists in any county or counties of the State, and warning all persons to seclude all animals in their possession that are affected with such disease or have been exposed to the infection or contagion thereof, and ordering all persons to take such precautions against the spreading of such disease as the nature thereof may in his judgment render necessary or expedient; to order that any premises, farm, or farms where such disease exists or has existed to be put in quarantine, so that no domestic animal be removed from said places so quarantined, and to prescribe such regulations as he may judge necessary or expedient to prevent infection or contagion being communicated in any way from the places so quarantined; to call upon all sheriffs and deputy sheriffs to carry out and enforce the provisions of such proclamations, orders, and regulations, and it shall be the duty of all the sheriffs and deputy sheriffs to obey and observe all orders and instructions which they may receive from the Governor in the premises; to employ such and so many medical and veterinary practitioners and such other persons as he may from time to time deem necessary to assist him in performing his duty as set forth in the first section of this act, and to fix their compensation; to order all or any animals coming into the State to be detained at any place or places for the purpose of inspection and examination; to prescribe regulations for the destruction of animals affected with the said infectious or contagious disease, and for the proper disposition of their hides and carcasses, and of all objects which might convey infection or contagion, (provided that no animal shall be destroyed unless first examined by a medical or veterinary practitioner in the employ of the Governor as aforesaid;) to prescribe regulations for the disinfection of all premises, buildings, and railway cars, and of objects from or by which infection or contagion may take place or be conveyed; to alter and modify, from time to time, as he may deem expedient, the terms of all such proclamations, orders, and regulations, and to cancel or withdraw the same at any time.

SECTION 4. That all the necessary expenses incurred under the direction or by authority of the Governor in carrying out the provisions of this act, shall be paid by the treasurer upon the warrant of the Auditor General, on being certified as correct by the Governor: *Provided*, That animals coming from a neighboring State that have passed a veterinary examination in said State, and have been quarantined and discharged, shall not be subject to the provisions of this act."

During the passage of this act the existence of the disease in the State had been denied. Hence, immediately after its approval, his Excellency Governor Hoyt appointed a commission to "Examine and determine whether infectious or contagious pleuro-pneumonia exists among cattle in any county or counties of this Commonwealth, and report the same to the Governor without unnecessary delay." This commission consists of Hon. Samuel Butler and Hon. H. C. Greenawalt, on the part of the Legislature; Thomas J. Edge, and C. B. Michener, on the part of the Board of Agriculture; Hon. John C. Morris and George Blight, on the part of the Pennsylvania Agricultural Society; and George S. Garrett, on the part of the dairymen of Philadelphia and vicinity. At the first meeting of this commission, Hon. John C. Morris was elected president, and Thomas J. Edge, secretary.

At a meeting held in Philadelphia, May 16, a large number of practical dairymen and veterinary surgeons were examined, and their evidence taken down by a stenographic reporter. As a result of this meeting Messrs. Morris, Butler, and Greenawalt were appointed a committee to report to Governor Hoyt, on behalf of the commission, that the disease did exist in, at least, two counties in the State, and that the decision of the commission was unanimous.

Under authority of the act before quoted and based upon the report of the commission, his Excellency Governor Hoyt appointed a special agent to take charge of the matter, to whom he issued the following commission:

"It having been ascertained that an infectious and contagious disease of neat cattle, known as pleuro-pneumonia, has been brought into and exists in certain counties of this State, I hereby appoint you as my assissant to carry out the provisions of the acts of 1866 and 1879, for the prevention of the spread of this disease. As such assistant you are hereby authorized:

"To prohibit the movement of cattle within the infected districts, except on license from yourself, after skilled veterinary examination, under your direction.

"To order all owners of cattle, their agents, employés, or servants, and all veterinary surgeons, to report forthwith to you all cases of disease by them suspected to be contagious; and when such notification is received, you are directed to have the case examined, and to cause such animals as are found to be infected with said disease to be quarantined, as also all cattle which have been exposed to the infection or contagion of said disease, or are located in an infected district; but you may, in your discretion, permit such animals to be slaughtered on the premises, and the carcasses to be disposed of as meat, if, upon examination, they shall be found fit for such use.

"You may prohibit and prevent all persons not employed in the care of cattle therein, kept from entering any infected premises. You may likewise prevent all persons so employed in the care of the animals, from going into stables, yards, or premises where cattle are kept, other than those in which they are employed. You may cause all clothing of persons engaged in the care, slaughtering, or rendering of diseased or exposed animals, or in any employment which brings them in contact with such diseased animals, to be disinfected before they leave the premises where such animals are kept. You may prevent the manure, forage, and litter, upon infected premises from being removed therefrom; and you may cause such disposition to be made thereof as will, in your judgment, best prevent the spread of the disease. You may cause the buildings, yards, and premises, in which the disease exists, or has existed, to be thoroughly disinfected.

"You are further directed, whenever the slaughter of diseased animals is found necessary, to certify the value of the animal or animals so slaughtered, at the time of slaughter, taking into account their condition and circumstances, and to deliver to their owner or owners, when requested, a duplicate of such certificate. Whenever any owner of such cattle, or his agent or servant, has willfully or knowingly withheld, or allowed to be withheld, notice of the existence of said disease upon his premises, or among his cattle, you will not make such certificate.

"You are also directed to take such measures as you may deem necessary to disinfect all cars or vehicles or movable articles by which contagion is likely to be transmitted. You will also take such measures as shall insure the registry of cattle introduced into any premises on which said disease has existed, and to keep such cattle under supervision for a period of three months after the removal of the diseased animal and the subsequent disinfection of said premises.

"You are further authorized and empowered to incur such expenses in carrying out the provisions of the foregoing orders as may, in your judgment, appear necessary, and see to it that all bills for such expenses be transmitted to this department only through yourself, after you have approved the same in writing

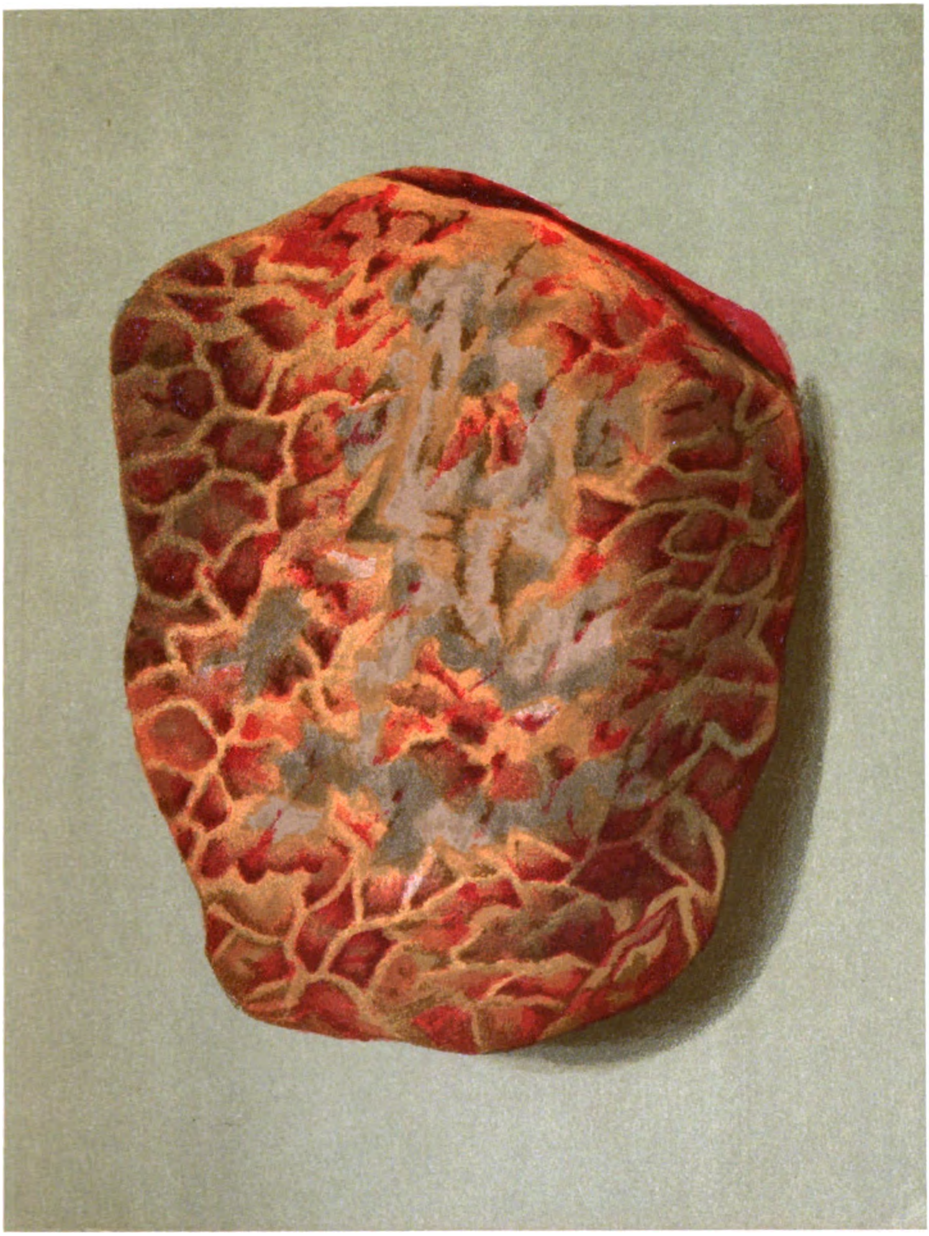
HENRY M. HOYT,
Governor.

"Attest: J. R. McAFFEE,
Deputy Secretary of the Commonwealth."

The agent of the Governor has issued the following notice:

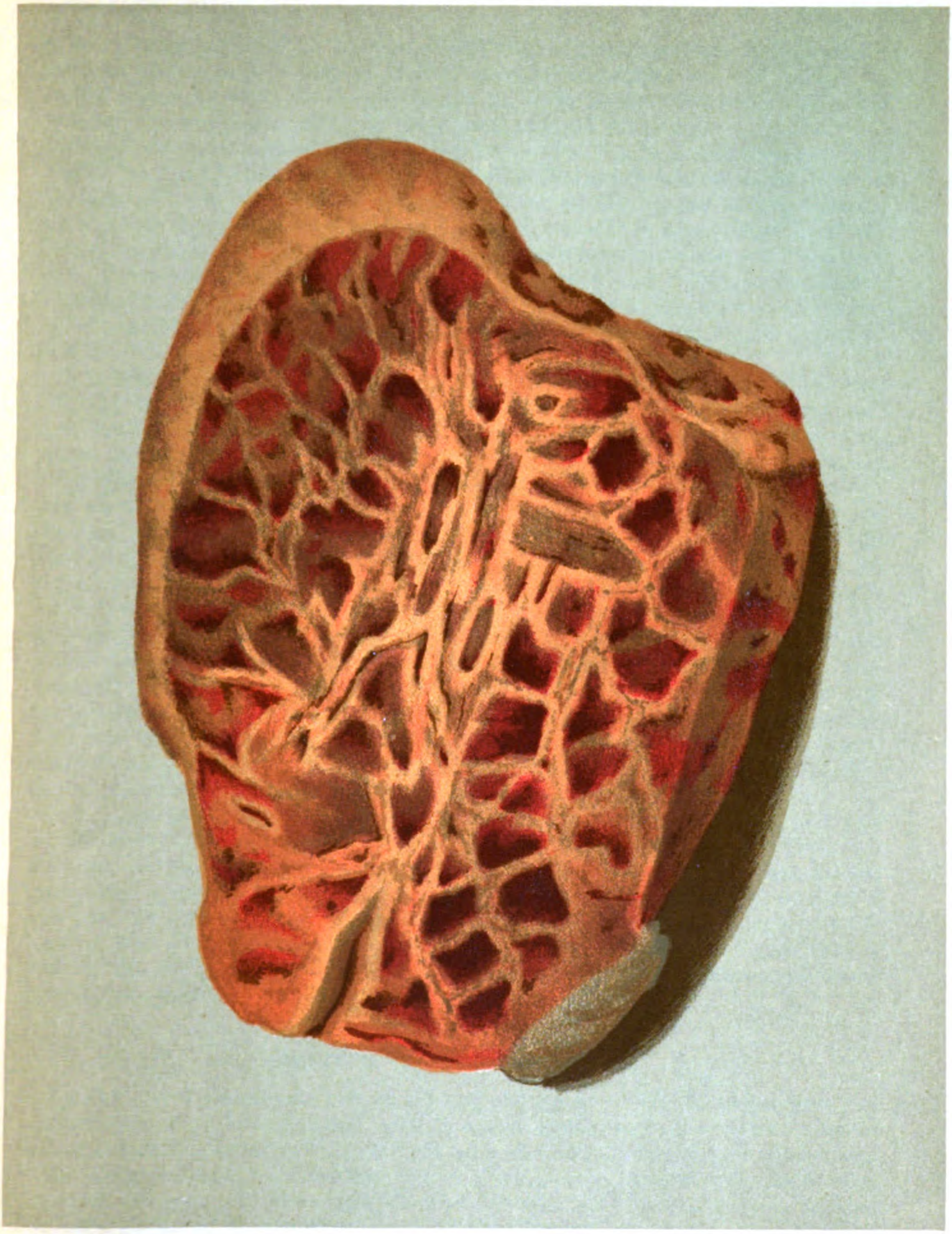
To all owners of cattle, their agents, servants, or employés; to all common carriers by land or water; to all veterinary surgeons, and to all others whom it may concern:

His Excellency Governor Hoyt, having decided to coöperate with the executive officers of the States of Massachusetts, Connecticut, New York, and New Jersey, in a united effort to eradicate the disease known as pleuro-pneumonia from the herds of the State, it becomes my duty, under the foregoing commission, to request that you will promptly report to me all



THE LUNG PLAGUE OF CATTLE.

External surface of diseased lung (Cow), showing the effusion on the pleural surface of a solid fibrinous exudation, giving it a mottled color in Contagious Pleuro-pneumonia.



THE LUNG PLAGUE OF CATTLE.

Section of the left lung of a Cow in an advanced stage of Contagious Pleuro-pneumonia, showing the characteristic marbled appearance formed by the exudation and consolidation of lymph into the interlobular cellular tissue. Weight of left lung 37 pounds; right lung 5 pounds.

cases among neat cattle by you suspected to be contagious or infectious. Without your coöperation and assistance, this attempt can only result in partial success; with it the result can scarcely be doubtful, and the work thus far accomplished gives us assurance of good results.

His Excellency is anxious that all owners of cattle, and others interested, should be fully impressed with the belief that this commission, as well as the laws of 1866 and 1879, for the prevention of the spread of the disease, are in their interest as well as that of the State. It is also the wish of his Excellency, that while the provisions of these laws are fully enforced and made most effective, and their purposes promptly and fully accomplished, it shall, at the same time, be so managed as to cause the least possible inconvenience and injury to all concerned, and with a minimum of expenditure to the State.

I would particularly call your attention to the language used by his Excellency in relation to the line of action to be pursued when interested parties have concealed the existence of the disease in their herds. This provision is very important, not only to the stock owner, but also to the State, for while the concealment of the existence of the disease will result in pecuniary loss to the owner of the stock, it, at the same time, greatly increases the danger of infection, and the subsequent expense to the State. With your active coöperation in this respect, we may hope for the prompt suppression of a disease which, while it has already caused a great loss to our stock owners, will, should it become established in our western States, inflict an incalculable and lasting injury to the stock-raising interests of the whole nation. So far as known, all infected herds in this State have been quarantined, and all diseased animals promptly isolated or killed. In the future, as in the past, it will be our duty to cause as little injury and inconvenience to the owners of stock as is consistent with our duties to the State, and to carry out, to the full letter, the directions of his Excellency relative to the valuation of all stock condemned and killed.

All reports of supposed infection should be made direct to the office, and all interested are requested to accompany the report with a correct and full account of the location of the herd, and the symptoms, in order that all unnecessary expense to the State may be avoided. No special line of action has yet been marked out for application to cattle in motion from one portion of the State to another, or to those in transit to other States, but it will be the duty of those in charge to cause the least possible inconvenience consistent with the best interests of the State.

Action of the State Authorities.

Under the commission before quoted the agent of the Govenor has, (up to November 1,) quarantined twenty-seven herds, including four hundred and eight animals liable to infection, and distributed in the following counties: Adams, one; Lancaster, four; York, one; Bucks, one; Delaware, four; Montgomery, five; and Chester, eleven. Of these herds eight, (one in York, three in Montgomery, and four in Chester,) have since been released from the quarantine, and pronounced safe from another outbreak, except from a fresh infection from outside sources.

As soon as the supposed existence of the disease is reported, each animal in the herd is inspected by a veterinary surgeon in the employ of the State, and if the disease is found to exist, is promptly quarantined to prevent its spread to adjoining herds, in order, and if possible, to prevent further contagion in the same herd, all diseased animals are appraised and killed.

The individual history of these herds may be briefly given as follows:

No. 1.—In York county—Infected by steers bought in Baltimore market. Six head were either lost by death previous to quarantine or were killed for the purpose of stopping the disease. The whole herd were more or less affected, though a number had very a light attack, and when released from quarantine, September 4, were as well as they probably ever will be. A rigid quarantine, which was very much assisted by the local surroundings, and the prompt support of neighboring stock owners, prevented the disease from infecting other stock, and the killing of diseased animals, and the use of disinfectants prevented further loss.

No. 2.—Containing twenty cows, two bulls, and ten calves, was quarantined June 12. Previous to quarantine, four head had died, and after the enforcement of the quarantine, fourteen head were killed. With one possible exception, *all* the animals were affected, and a number of them are now in a condition in which they are worse than useless to the owner. In this case the evidence is strongly in favor of the theory that the owner conveyed the disease to his herd by assisting in the care of another infected dairy. No spread of the disease to adjoining farms; but it is quite probable that the disease was carried from this herd to herd No. 8 in the clothing or on the person of the owner, who administered medicine to both herds. This herd has furnished an illustration of the disease in one of its worst forms, but is now believed to be clear, but not beyond the danger of infecting other stock.

No. 3.—In Delaware county, contained fifty head of stock, and previous to quarantine a number had died. The probability is that the disease was introduced by purchase. After passing into the charge of the State authorities, eleven of the herd were killed. This herd, with Nos. 2 and 7, furnish by far the most stubborn cases we have yet met with. In all three cases every animal had been repeatedly exposed to infection before the existence of the disease was reported, and we may here state that, in other herds, when the first sick animals were promptly isolated, and the case reported, the loss by death has been very slight. By allowing the sick and well to run together all are infected before the assistance of the State is asked.

Nos. 4, 5, and 5½.—Adjoin one another, and the farms are all traversed by the same small stream. The disease seems to have originated on the upper farm, where the first sick animal died in the stream, and was buried close to its banks. In No. 4 one animal died, and one was killed; and in No. 5 the first one was promptly killed. In both cases the importance of immediate isolation was understood and put in practice. Nos. 4 and 5 have been released from quarantine, but No. 5½ is still infected. Whether, in these cases, the stream was the vehicle of contagion or not, we cannot say, but the almost simultaneous outbreak on the three farms can be accounted for on no other hypothesis.

No. 6.—Had lost eleven head previous to being reported and quarantined. With one doubtful exception, every animal had shown more or less of the effects of the disease, and its owner fully appreciated its contageous nature. Has been released from quarantine.

No. 7.—In Lancaster county, was composed of forty-two animals, and when reported had been thoroughly infected by two sick animals running with the herd. In this herd seven animals were killed in one day, and seven placed under quarantine; fifteen have been killed, and to all appearance the disease has been checked. The infection, no doubt, came from an adjoining herd, which in turn had been infected by stock from New York.

No. 8.—Is supposed to have been infected by the owner of No. 2 administering medicine to the animals after attending to his own. Seven head have been lost in this herd, and the others are not clear of the danger.

In No. 9, containing thirty-one head, the disease seems to have been checked by the prompt isolation and killing of one animal, and has since been released from quarantine.

Nos. 10, 11, and 12.—Are small herds, in two of which every animal exhibited symptoms of the disease, but by rigid care on the part of the owners by isolating, and the prompt death of infected animals, the loss has been small.

Nos. 13 to 20, inclusive.—Are herds which have been recently reported, and quarantined, and, thus far, the losses in them have been slight. By the prompt action of the veterinary surgeon, assisted by care and coöperation on the part of the owner, it is hoped that most, if not all of them, have past the worst point, and that some of them may be released from quarantine as soon as the proper time has elapsed.

No. 21.—Was infected by six cows purchased in the Philadelphia market, and showed itself ten days after the purchase—of the six, five have died or been killed, and others are affected. The purchased cows have been traced to the Philadelphia droveyard, but here all further clue to the origin of the disease was lost.

No. 22.—In Montgomery county was quarantined October 24, and was infected by a cow purchased from a drover, at the time of purchase she was coughing, and when examined by our surgeon in a week afterwards, she was to far gone that the owner was willing to have her killed as worthless and without a value.

No. 23.—Was infected by contact with the animals in herd No. 16 previous to quarantine—at the request of the owner, who has ensured complete isolation, they are being treated by our surgeon—in this case the fumes of burning sulphur seems to have been affective in preventing further trouble, but all the herd were or are more or less affected.

No. 24.—Containing thirty-three head were, no doubt, infected by contact with herd No. 7, as, by accident, they were in the inclosure containing the former herd for a short time.

No. 25.—Was allowed by its owner to graze alongside of No. 7 with no separation other than that afforded by a creek and common fence. Before the infection was reported, most of the steers (fat) were sent to market, but one left on the farm has shown all symptoms of the disease.

In addition to the care of stock already in the State, the agent of the Governor has had control of all the stock brought into the State from Europe, and not quarantined by the national or the authorities of other States. The United States Government imposes a quarantine of ninety days upon all such cattle, but in such States as have quarantine regulations already established, they are surrendered to the State authorities for inspection and quarantine. Under these rules now in force in this State, these cattle must present a certificate of clearness from any contagious disease at the point of shipment in Europe, where they are inspected by a government surgeon, must be inspected on their arrival in the State by a veterinary surgeon in the employ of the State and under the control of the Governor's agent, must be quarantine closely at the expense of the importer, under the supervision of the State surgeon, and must be again examined at the close of the quarantine, and if found clear, are granted a certificate which will authorize the removal to any point in the State. In enforcing this quarantine, care is taken to consult the interest of the importers so far as it is consistent with the interests of the State, and the step is made necessary not only to protect our stock from infection by pleuro-pneumonia, but also with hoof and mouth disease, rinderpest and other contagious diseases.

Name, History, Nature, and Symptoms of the Disease.

It is unfortunate that the common name—pleuro-pneumonia—should have been selected to designate this disease. In the debates in the Legislature, during the passage of the act, in the daily correspondence of the Board of Agriculture, in the agricultural and daily papers, and even in some scientific journals, this name has caused much confusion and needless dispute. By many it has been confounded with common or sparodic pneumonia, which is not contagious, and which may, in all cases, be traced to exposure, neglect, or to a violation of some law of nature. This common pneumonia will *originate* in a locality, while the lung plague, called pleuro-pneumonia, has never yet been proven to thus originate in any locality in this country; but if its cause can be traced at all it is found to have proceeded from contagion conveyed by another animal, or from the excretion from the bowels, kidneys, skin, or lungs of another animal. No amount of neglect or bad treatment will develop this disease, and we think it may be assured that no bad treatment, or abuse, will develop a contagious disease of this kind. It is now too late to hope to effect a change of name, but many have been suggested as not only more appropriate, but also more satisfactory to the general reader, and average stock breeder. Prof. Hertwig, of Berlin, gave it the name of *Lungenseuche;* Haller called it *Viehseuch;* Cathbert styled it *Peri-pneumonia;* in Italy it is known as *Pulmonæ de bovini.* In fact, in different countries, and at different times, it has had names of all lengths and styles, from the "Murie" of Brougelat to the "*Peri-pneumonia exsudation enzootica et contajiosa*" of Gieleu. Throwing aside all technicalities and form, we think that the plain name, "Contagious lung plague" will best suit the case.

When, where, or how, this disease first originated (for it must have had an origin) no one can say with any great degree of certainty. Delafond quotes Aristotle as writing of his time, that "The cattle which live in herds are subject to a malady, during which the breathing becomes hot and frequent. The ears droop, and they cannot eat. They die rapidly, and on opening them the lungs are found spoiled." The history of the disease in this country may be thus briefly summed up.

The first notice of its existence was in a cow imported from Germany in 1843, and landed in Brooklyn, and it has been claimed that since then this locality has never been free from the disease, and now forms the main center of contagion with which the New York authorities have to contend. In 1847 it was brought from England into New Jersey, and in 1850 was again brought into New York by a cow imported from Europe. It was prevalent in Camden and Gloucester counties, New Jersey, in 1859, and in 1860 broke out among the dairies near Philadelphia. In 1861 it broke out in Delaware county. The Philadelphia cow market served as a center, and the contagion gradually spread to surrounding counties, and soon Baltimore and the surrounding district was affected, and the disease now threatens to obtain a foothold in southern counties of our State from this center of contagion.

The dairyman who have lost from fifty to seventy-five per cent. of his stock, has very little sympathy with any one who will claim that the disease is not contagious. Finding a newly purchased animal sick with an, to him, unknown complaint, which defies all treatment, and soon runs its course in the first animal, and sooner or later attacking every animal of the herd, in some cases proving fatal in more than fifty per cent. of the attacks, and leaving those which *apparently* recover, in many cases, in a condition worse than useless, he discards all fine theories, all fine drawn arguments of medical men, and assumes that he has to deal with a contagious disease over which he can exercise little or no control.

When, as has been the case in this State since the passage of the law of last winter, he sees seven of his animals all at the same time affected with the same symptoms, each passing through exactly the same stages of disease, and when killed and opened each presenting exactly the same post mortem evidence of the same disease, his common sense teaches him that the sick contaminate the well, and that the disease will, in this way, not only spread from animal to animal, but also from herd to herd until the whole country will be infected.

The fact that inoculation will produce all the symptoms of the disease, and when a country becomes thoroughly impregnated with the disease is a last resort, is perhaps sufficient proof of the contagious nature of the disease, but as further proof we quote as follows from our best authorities on the subject of this and other diseases:

Prof. Williams, of Edinburg, in "The Principles and Practice of Veterinary Medicine," page 139, when treating of pleuro-pneumonia as contagious, says it is "A contagious febrile disease peculiar to horned cattle having an incubative period of from two to three weeks to as many months, at the end of which local complications arise in the form of extensive imflammatory exudations within the substance of the lungs and upon the surface of the pleura, finally resulting in consolidation of the pleural surfaces."

In his "Farmers' Veterinary Adviser," Prof. Law, in treating of this disease, says, (page 14-15,) it is—

"A specific contagious fever of cattle, with extensive exudations into the chest and lungs. The period of latency of the poison in the system is from four to six weeks, and in exceptional cases perhaps two or three months, or as short as ten days."

In his "Manual of Veterinary and Sanitary Science and Police," Fleming says, (Vol. I, page 408:) "This pleuro-pneumonia of cattle is a specific and contagious disease peculiar to bovine animals, and of a sub-acute or chronic character. It usually appears as an epizootic or enzootic malady, and in the subtilty of its contagion, its general diffusion, and the great fatality attending it, it is a most serious scourge. In ever country in which it has appeared it has caused an immense destruction."

In his work on "The diseases of Live Stock," Dr. Tellor styles pleuro-pneumonia "A contagious fever of cattle, accompanied by great prostration, together with local inflammation, and other diseased changes in the lungs and their envelops. This is no doubt a specific blood poison."

In his "Four Bovine Scourges," Prof. Walley, of Edinburg, says: "Zymotic pleuro-pneumonia is an insidious exudative zymotic disease, due to a specific poison or ferment, peculiar to the ox, and having its local manifestation concentrated in the lungs and pleuro. No age, breed, or class, neither sex of bovine species enjoy immunity from the effects of the virus of this disease. Zymotic pluero-pneumonia has a well defined, though extremely uncertain incubatory stage, and is alike contagious (by actual cohabitation) and infectious."

In his report to the National Government, (illustrated edition, page 29,) Prof. Gamgee says: "Not only have theories in relation to the cause or combination of causes which may lead to the development of pluero-pneumonia been unsatisfactory, but opportunities are constantly presenting themselves to test the fact that privations, over-crowding, impure food, and water, &c., singly or combined, may help, but never induce the disease which presents the characteristics of the one referred to in this report. The malady may be produced at will, by placing an animal suffering from it among healthy ones, and by direct inoculation. These are the only methods by which it is propagated."

In his official report, Hon. W. C. Le Duc, National Commissioner of Agriculture, states that "Pleuro-pneumonia is a malignant contagious fever, to which, as far as known, cattle only are liable, and in them is accompanied by inflammation and other diseased conditions of the lungs and their membranes, together with great prostration of the entire system. It proceeds from a poisoned condition of the blood. How, when, or where this poison was first generated it is impossible to tell. Nor is it less difficult to determine its specific nature. So far as reliable information has yet reached, it is never generated spontaneously, but depends entirely on the introduction of a virus or contagion into the system of a healthy animal. A single animal so infected infects the herd; the herd, sub-divided and scattered, infects other herds, until in time large areas of country have been visited and devastated by the fearful scourge."

Symptoms.

In its earlier stages it is very difficult to detect this disease, but in all cases where animals have been recently purchased, or where the affection is plainly one of the lungs, it is safest to assume that it is the so called pleuro-pneumonia, and at once isolate the animal. If it is the disease it will soon make itself known by its after symptoms; if it is not it, no harm is done beyond the small amount of additional trouble caused by the isolation.

In its incubating or first stage the disease is not accompanied by that intense inflammation which afterwards is manifest; yet there is in all cases a slight increase in the temperature, as shown by a thermometer inserted in the rectum. This latter test alone will not prove satisfactory, because a rise in temperature may proceed from other diseases and other causes than pleuro-pneumonia; and as a rule, our surgeons place little reliance upon this test, except when, in addition to other symptoms of a more decided nature, it may be taken as cumulative evidence. While owing to peculiarities in constitution, different animals are affected (in the primary stages) to different degrees and in different ways, we merely take the following as covering a large majority of cases.

In all cases there is more or less shivering, which, in many cases being slight, may pass unnoticed, or which may result from any other cause producing fever. In milking cows, one of the primary results of infection is often an increase in the amount of milk, which naturally results from the unusual excitement of the nervous system, but in a very short time this passes off, and instead of giving a large pail full, as at the previous milking, the amount will often quickly fall off to less than one quart. The animal shows an evident disinclination to associate with the others, and is usually to be found in a fence corner or corner of the yard, by itself. If the herd are accustomed (as is the case with milk cows) to come up to the buildings at certain hours, the infected animal will usually linger behind the others, or will refuse to come in at all. In such cases, if a ditch is to be crossed, it will usually be found upon the bank furthest from the buildings. The pulse is much increased and the respiration irregular and much disturbed. The animal stands with its back arched, and on applying the ear closely on the diseased side, an unusual and abnormal sound may be detected, similar to that caused by the friction of two thin pieces of dry paper or partially dried hide.

As the disease progresses, the surface of the body and partially the extremities become cold; the mucous membrane at the external orifices of the body becomes hot, and is indicative of the inflammation within; the bowels in a majority of cases become constipated, but in some cases which have come under our notice the reverse has been the case; the skin becomes dry, the coat stares, shivering fits set in, the breathing becomes more hurried, and the pulse reaches eighty-five to ninety per minute, and an increased harshness or grating is heard in the diseased lung and bronchial tubes. A peculiar dry and husky cough sets in which is heard in no other disease, and which, having once been heard, although it cannot be described, is at once recognized by the surgeons or by the stock-owner who has been so unfortunate as to have the disease in his herd. In the concluding stages all these symptoms are very much intensified; the cough becomes more frequent, and from its increased intensity and the weakened condition of the animal, evidently is more painful, and is usually accompanied by a peculiar grunt or moan, indicative of intense pain. If not so before the bowels become constipated, the skin is more tightly drawn over the protuberances of the body, flesh is lost rapidly, much more so than can be accounted for by the mere abstinence from food; the pulse becomes very irregular, and the animal seeks release from the pain and difficulty of breathing by standing with its elbows thrown out from the chest, and intense pain is shown by a pressure on either side of the spine just back of the shoulders. In the later stages of the disease there is usually a peculiar twitching of the nostrils and corners of the mouth, the exhaled breath is very offensive, and is plainly indicative of the corruption which exists within.

The veterinary surgeon of the Board of Agriculture gives the following summary of the physical symptoms which, after a very little practice, has enabled those who have the disease in their herds, *by a daily examination*, to select the infected animals and at once isolate them, and thus save much loss to themselves and expense to the State:

"By placing your ear at the bottom of the neck, a loud rushing sound of air is heard in the trachæ and bronchial tubes. The same sounds are heard at the top and sides of the chest, just behind the shoulder blade. Below and back of these parts no sound at all is heard, showing that the lungs are consolidated by the fibrous exudations which are being constantly thrown out. At the commencement of an attack, we can often notice what is called the 'friction sound,' from the rubbing together of the thickened and rough membranes during respiration. Should one lung only be affected, the respiratory murmur in the healthy lung is much increased, in consequence of its having to perform double duty. When both lungs are diseased, we expect peculiar effects and sounds, according to the intensity and extent of the lesions. There is increased resonance on percussing the healthy lung, while over the diseased part, a dull, heavy sound is elicited."

In all cases, a post mortem examination should be made which will indicate some or all of the following conditions, as given by the surgeon of the Board of Agriculture:

"On exposing the thoracic viscera, one of the first indications of epizootic pleuro-pneumonia is the escape of large quantities of fluid from the cavity. This fluid mostly contains large patches of yellow, plastic, or coaguable lymph floating about in it. As a result of the inflammation which has been going on, we find that this plastic lymph has fastened the lungs to the ribs, and formed what we know as 'false membranes,' or 'adventitious tissue.' These false membranes are sometimes fastened to the diaphragm and heart, as well as the sides of the chest. The lungs are found to be exceedingly heavy, often weighing from fifty to seventy-five, and even one hundred pounds, sink in water, and instead of the bright salmon color of health, we observe a dirty gray color, mottled, and having the appearance of marble. The surfaces are rough and thickened, and the lung substance hard and firm. The bronchial tubes are frequently found entirely blocked up with fibrinous deposits, thus shutting off the contact of air with the blood, and producing death by suffocation.

This exclusion of the atmospheric air from the lungs, accounts for the dark purplish color of the transuded blood corpuscles, and fibrinous exudations. In some of the more advanced cases, abscesses are found in the substance of the lungs, which either discharge through the bronchial tubes, undergo degeneration, (the *amyloid* most frequently,) or else the discharge takes place within the chest, which gives rise to the *amphoric rale.* All the other organs of the body are (as a rule) found to be in a state of health."

Conclusion.

In our dealings with the disease under the immediate direction of the Government, we find many points upon which scientists differ, and which it would be impolitic for a layman like ourselves to endeavor to settle ; but of one point we feel certain, and in which we have the indorsement of *every* practical man who has had the disease among his stock, and this is the contagious and dangerous nature of the disease. Whether the disease can only be conveyed from animal to animal by actual contact, or whether it can or cannot be conveyed in the clothing, by the excretion, breath, or animals of another tribe; whether the disease is of ancient or of comparatively recent origin; whether it can be carried from herd to herd by a stream of water; whether it can be intensified in its ravages by bad ventilation or bad treatment; whether a complete separation of a certain specified number of feet of space will or will not prevent infection; whether in its first stages it is or is not contagious; whether it will or will not affect sheep, are all questions for scientists to determine, and which all are lost sight of in the one great question, in the solution of which we are engaged—can the disease be eradicated by prompt and rigid action in the manner proposed? If so, all these questions can be solved in the future; if not, then the future of our stock breeders is indeed precarious. In defense of the propriety of the action of the joint committee of the Legislature, and of the Legislature itself. as given in the foregoing pages, we have nothing to say, except that the end in view justifies the means. If by the expenditure of a few thousand dollars by the State, we can save hundreds of thousands to her stock breeders and stock owners, and as many millions to the country at large, then we think no one will complain. If the result in New York, New Jersey, and Pennsylvania shall demonstrate that this cannot be done, we may still point with pride to the fact that this action has saved more thousands than it has cost hundreds; has demonstrated to other States that when Pennsylvania is appealed to for coöperation in a good cause, she is not slow to respond; and that when so important an interest is in danger, the State is not slow in her attempt to extend a helping hand.

INDUSTRIAL EDUCATION IN EUROPE, AS IT RELATES TO AGRICULTURE.

By Prof. J. P. WICKERSHAM, *Superintendent of Public Instruction.*

It was a part of my mission in visiting the different countries of Europe, to examine schools established with a view to promote the several industrial interests; but as my attention was mainly directed to art schools and schools of manufacturing and mechanics, what I learned there of education as it relates to agriculture was picked up incidentally, and should not have the weight properly attached to close and careful personal observations. But to give a full account of the little that I saw and learned, would require a good-sized volume, and all I will now attempt to do is to present to the Board a brief outline of the subject, in the hope that it may prompt the desire for further information.

1. AGRICULTURE IN THE PUBLIC SCHOOLS.—The elements of the natural sciences, which form the basis of all knowledge relating to agriculture, are taught almost everywhere in the public schools of Europe. The instruction is mostly given orally, in the form of object lessons, but sometimes appropriate manuals are placed in the hands of the pupils for study. They do not make the great mistake of our schools in compelling their pupils to spend so much time upon lessons in the details of geography that are of no use to them, and lessons in abstract arithmetic and grammar they do not understand, and keeping them ignorant of the interesting world of nature in which they live and move. In some countries, it is a common thing to see, even in the lowest grade of schools, collections of objects, minerals, plants, fruits, grains, grasses, woods, etc., upon which lessons are frequently given.

In addition to this kind of instruction, so useful to the farmer, agriculture is taught as a branch of learning in thousands of public schools in France, Germany, Switzerland, Belgium, and other countries. Its elementary principles are simply stated and easily exemplified, and I can readily understand, what I was frequently told, that no other study of the whole course awakens more interest. The profit, even to those who never intend to become tillers of the soil, is vastly greater than can result, for example, from the study of long lists of the names of mountains, rivers, and towns, in the far-off countries of Asia or Africa. And this kind of instruction is not only given theoretically, in the school-house, but practically in the adjacent grounds. The building in which school is kept in villages and country districts on the continent of Europe, is generally a school-house, and a dwelling-house combined. Here the teacher lives, as well as teaches. He is allowed the use of the grounds attached to the school-house, oftentimes several acres in extent, every square inch of which is cultivated with the greatest care. I have seen these grounds divided into a yard with grass and walks, flowers and shrubbery; a garden with a variety of vegetables; a small orchard and vineyard, and several miniature fields with growing crops. The boys spend a part of their time on these grounds at work with the teacher, and, under his direction, learn the arts of lawn dressing, gardening, fruit growing, and farming generally. It is a pleasant sight to see a teacher and his boys employed in this way, and no one can doubt that in such cases the instruction imparted outside of the school-room is quite as valuable as the instruction imparted within it. Interest is added to the picture, too, when you find that the sisters of these boys are at the same time, and in the same schools, learning to sew, knit, and cut out garments, and sometimes take lessons in practical house-keeping. The spirit that animates this kind of practical instruction, is shown in a circular somewhere met with, issued by one of the agricultural inspectors to the teachers of the Vosges, in France. He urges them not only to convert the lands at their disposal into schools for teaching practical farming, gardening, and fruit growing, but to accompany their pupils from time to time to the best kept farms of the district, and to make a special study of the stables, fields, cattle-houses, and vineyards.

Agriculture is taught both theoretically and practically in a large number of the Irish national schools. I had barely time to look at one of these, the one at Larne. It is a school quite similar to one of our graded or union schools, with an agriculture department, and a piece of land which the boys cultivate. There are only seven acres in the little farm, and yet the management contrives to raise upon it all kinds of crops incident to the climate; too keep horses, cows, pigs, and poultry; and to set apart space for an orchard, a garden, and a lawn. The instruction in the school embraces the elements of botany, zoology, mineralogy, and chemistry; the formation, nature, and difference of soils; the rotation of crops; draining, trenching, and sub-soiling; the raising and feeding of stock; gardening, fruit-growing, etc., etc. In their outdoor work on the farm, the boys apply what they learn theoretically, test methods, and make experiments.

2. AGRICULTURE IN HIGHER INSTITUTIONS.—I have said something as to what is done in European countries in the way of imparting instruction in agriculture in the elementary schools. I have now to inquire how the same work goes on in the higher institutions, the normal schools, the polytechnic schools, and the universities.

Institutions for the training of teachers are called normal schools in Europe, as well as in America; but they are much more numerous in the most enlightened countries abroad than with us. In Germany alone there are nearly two hundred of these schools, and in France an equal number. The courses of study in the normal schools are arranged with special reference to the training of teachers; but as showing the high consideration given to the farming interest, they very frequently include instruction in theoretical and practical agriculture. The governmental authorities desire to have this kind of instruction imparted in the elementary schools, and they are wise enough to see that the only way to bring it about is to prepare teachers who will be able to carry their wishes into effect. Many of the normal schools have farms connected with them, and the student-teachers are not only required to study, but to work. A part of the course is that they shall be able to perform, with skill, the work of the farm and garden. The students in our normal schools might object to this kind of discipline; but I am not at all sure it would not be as advantageous here as in the Old World.

Not only is instruction in agriculture given in many of the normal schools, but provision is made in some of the agricultural schools for a special course for teachers. This is especially the case at the fine establishment at Glasnevin, three miles from Dublin. Here there is a model farm of one hundred and twenty-eight acres, with buildings well adapted for the purpose, a nursery, gardens, etc. The students are mainly young men who are preparing for teachers. They study and work alternately, and, after graduation, those who propose to follow the business of teaching go forth to spread a knowledge and diffuse a love of agriculture, through the schools, among the people of the rural districts of the country. More than a thousand teachers have been prepared in this way at Glasnevin. At the Agricultural Institute at Hohenheim, near Stuttgard, Germany, one of the most celebrated institutions of the kind in Europe, there are several special courses for teachers, one for students from the neighboring normal schools, another for teachers during vacations, and still another to prepare teachers for holding evening agricultural schools during the winter months.

We have polytechnic schools in this country, but they cannot be compared in any respect with the great polytechnic schools in Europe. I visited schools of this kind in Zurich, Munich, Vienna, Prague, Dresden, Berlin, and Paris. Their object is to impart a thorough scientific and practical education. Most of them are well supplied with philosophical apparatus, and have rich and well arranged scientific collections, industrial museums, art galleries, and botanic gardens. Some of them have an attendance of over a thousand students. Their course of study is very full and complete, including, in many cases, a department of agriculture. With engineers, architects, chemists, machinists, merchants, and other skilled masters of the matter and the forces of nature, they aim to make good farmers—farmers who understand the principles that govern their work.

Nor do the great universities of Europe overlook the interest of agriculture, as is too apt to be the case with the higher educational institutions of this country. Regular courses of lectures are delivered on this subject at the Universities of Edinburg, Bonn, Berlin, Halle, Munich, Leipsic, Giesen, Jena, and others. It will be remembered, as an example of the kind of instruction imparted in these courses, that Liebig delivered his celebrated lectures on agricultural chemistry at a German university. Some of these universities, too, even have agricultural schools and model farms connected with them. The agricultural institute at Jena is an integral part of the University of Jena, and the agricultural college at Poppelsdorf is under the same management as the University of Bonn. The Royal Academy of Agriculture and Rural Economy, at Eldena, occupies lands belonging to the University of Griefswald, and its professors are in part the same.

3. Special Schools for Instruction in Agriculture and Related Subjects.—The governments of Europe not only see that instruction in agriculture is largely given in their elementary schools and in higher institutions of learning; but they have established in great numbers special schools for this purpose. There are many schools of agriculture, horticulture, forestry, veterinary, and, here and there, one for meadow culture, fruit culture, silk culture, the culture of the vine, sheep raising, the raising of bees, working in flax, etc. There are probably one hundred such schools in France, an equal number in Germany, and as many proportionally in Holland, Switzerland, and Belgium. Some of these schools are small, not having more than ten students, but at others the attendance is quite large.

The special agricultural schools of Europe differ so much in kind and grade that it is difficult to characterize them without a detailed description much too long for the purposes of this paper. We will notice only those that seem to be of most interest.

First, there are the schools whose main object it is to make expert laborers on a farm. They are practical farm schools. In these the pupils have very little to do with books or theoretical instruction. They work nearly all the time with their teachers in the stables, the gardens, the vineyards, the orchards, the fields. When not thus employed, especially during the winter months, they sometimes review their work, with reference to the principles involved in it, read agricultural publications, or listen to lectures on agriculture. More rarely, they pursue a course in what are called here the common school branches. But these schools are not designed to make scholars or thinkers. Those who attend them are the sons of peasants, are poor, and seldom own land. The purpose is to acquaint them with farming operations, to accustom them to handle tools, to make them active and skillful tillers of the soil. In Germany, such institutions are called ackerbauschule.

Next in grade above the ackerbauschule, are the schools for practical farming. These are designed for young farmers and farmers' sons. They possess rooms for study and recitation, and a farm for work. No pupils are admitted who have not received a good elementary education. In summer, nearly all the time is spent out of doors, on the farm; in winter, several hours are given daily to the study of the sciences that relate to agriculture. The object is to make the pupils acquainted with all the branches appertaining to the business of a well-organized farm, and especially to explain the underlying principles of farming operations. Instruction is given both from text-books and by courses of lectures, and many of the schools are well supplied with apparatus, and possess good scientific collections. The practical instruction is based on the plan of gradually perfecting the pupils in all the varied work of the farm. They commence with simple operations, and then pass on to those more difficult. Practice is given them, alternately, in feeding and caring for stock, in making and using manures, in cultivating and gathering crops, in gardening and fruit-growing, in draining and irrigating, and in all other varieties of farm work. There are schools of this class at Zwätzen, Annaberg, Schleissheim, and elsewhere in Germany. To this class belong also the farm schools or model farms of France. France has more than fifty of these institutions, and they are rapidly multiplying. There are nearly four hundred arondissements, corresponding to our counties, and it is the intention of the Government to establish a farm school in each. The buildings and land belonging to these schools are generally owned by private parties, and the schools are carried on at the risk of the owners. All schools, however, that are approved by the Government receive a subsidy sufficient to pay the salaries of the teachers and the boarding of the students. Each school must have at least twenty-four pupils, and must be so conducted as to present a good example of tillage to the section of country in which it is situated, and to show a fair return of profit. Rigid inspections by Government officers frequently take place, and institutions that are not well managed are discontinued.

The object of these farm schools is, first, to furnish an example of good farming to the farmers of the district; and, second, to form by proper instruction and training a body of skilled agriculturists. All pupils must be over sixteen years of age, and possess a good elementary education. The work on the farms is performed wholly by the pupils and their teachers. A teacher is always present to take part in and direct the work. It is his duty to explain on the ground why one instrument is preferable to another; why certain operations should be performed in a particular way, and not differently; and what the causes are which produce the effects noticed. In short, all the work done is considered in the nature of an experiment illustrating a principle, and thus the head is used to direct the hand. And, further, the work on each of these model farms is so managed as to epitomize the farming operations of a whole section of country. Whatever crops are raised in its neighborhood are raised on the farm. Nearly all of the farms engage in breeding and fattening stock, and possess dairies, gardens, and orchards. Some of them cultivate grapes, take care of forests, keep sheep, grow silk, make honey, &c. The course at these farm schools is generally three years, and, in addition to the practical instruction, which is the main object, the pupils receive lessons in the elements of agricultural science, and in subjects that will be most useful to them in working or managing a farm.

Would it not be possible to organize our three Pennsylvania model farms somewhat after the manner of these French model farms? Or, what stands in the way of such an enterprise being set on foot by one of our county agricultural societies, or by a body of public spirited farmers? There are among the very best farm schools in France those that furnish free boarding and free instruction to from twenty-five to fifty pupils at a cost to the Government not exceeding $2,000 or $3,000 a year.

We now come to speak of the agricultural colleges, or institutions for instruction in agriculture of the highest grade. These colleges have theoretical courses in all the branches of learning that relate to agriculture, and ample facilities for teaching practical farming. Among the most celebrated, are the institutions at Poppelsdorf, near Bonn; at Hohenheim, near Stuttgard; at Weihenstephen, near Munich, Germany; at Krumman, Bohemia; at Grignon, near Paris, France; and at Glasnevin, near Dublin, Ireland. All the schools of this class have houses for boarding the pupils, apartments for the teacher, and rooms for lectures and recitations. Most of them have libraries, reading-rooms, laboratories, and collections of farm products, and of tools and machines used on a farm. They are well supplied with barns and other buildings necessary in conducting farming operations on a large scale in great variety. The farms are, generally, large tracts, with a variety of soils. At Hohenheim, there are eight hundred and twenty-five acres under cultivation, with an adjoining tract of five thousand acres of government forest. The farm at Weihenstephan consists of six hundred and fifty acres, and that at Grignon of eleven hundred and seventy acres. Everywhere fields are set aside for experiments. Botanic gardens are frequent; stock of different kinds, horses, cattle, sheep, are bred and cared for. Herds of cows are kept for dairy purposes. Much attention is given to the raising of poultry, and at some of the schools there are stocks of bees. You will find here, as at the farm schools, nurseries, orchards, gardens, forests, vineyards, lawns, meadows. Great care is taken with the manufacture of manures. Cider, vinegar, and beet sugar, are sometimes made. Silk culture is carried on to some extent. Shops on the farms usually make and repair the farm tools and machinery. Fill up this outline with the necessary details, place in the management a body of professors as expert in practical farming as they are learned in scientific agriculture, and you will have an idea of the practical advantages these colleges offer to the young farmer. The standard for admission is as high as that for admission into one of our literary colleges, and the course continues three years. As a general thing, the pupils work nearly all the time the first year, about half the time the second year, and very little the third year. During the last year they frequently become superintendents or inspectors of work.

In order to show the comprehensive character and thoroughness of the course of study in these colleges, I will give, in some detail, but much more briefly than is the case in the original programme from which I quote, what is taught at Poppelsdorf, which, as I have already said, is one of the leading agricultural institutions of Germany:

A. Agriculture.—1. Knowledge of the soil. 2. Study of manures. 3. Clearing, draining, and working land. 4. The knowledge of agricultural implements and machines. 5. The cultivation of grain and fodder. 6. The cultivation of materials for manufacturing purposes. 7. The cultivation of grass lands. 8. The cultivation of vines and vegetables. 9. The cultivation of fruit trees.

B. Cattle Breeding.—1. The general rearing of animals, race, parentage, climate, etc. 2. The breeding of horned cattle, working, feeding, fattening. 3. The dairy. 4. Horse-breeding, and knowledge of the external parts of horses. 5. Rearing sheep. 6. The knowledge of wools. 7. Rearing smaller animals, pigs, poultry, etc. 8. Sanitary matters connected with the treatment of domestic animals.

C. Theory of Farming.—1. Principles of political economy involved in rural economy. 2. Systems of farming. 3. Valuation of land and instructions in making estimates of productions. 4. Agricultural book-keeping. 5. Agricultural calculations.

D. History of Agriculture.—1. History and statistics of agriculture. 2. Literature of agriculture. 3. Agriculture in different countries.

E. Forest Economy.—1. Forest culture. 2. Forest industry, the protection of forests, valuation. 3. Hunting and fishing.

F. Chemistry in all its departments.

G. Physics in all its departments.

H. Mineralogy, *Geology*, *Botany*, *Zoology*, *Meteorology*, as related to agriculture.

I. Mathematics as applied on the farm.

J. Political Economy and Jurisprudence, as related to agriculture.

K. Veterinary Science.

L. Anatomy and Physiology.

M. The *Architecture* of farm buildings.

This course of study tells its own story, and I need add no comments.

4. AGRICULTURAL MUSEUMS.—I visited a number of these museums in the Old World, and was greatly pleased with them. They are found in connection with general industrial museums, and sometimes at the polytechnic schools and agricultural colleges. The following, from my note-book, will give an idea of what they contain:

1. *Models of Buildings on a Farm.*—Houses, barns, outbuildings, granaries, dairies, slaughter-houses, farm-shops, etc. Drawings. Plans.

2. *Pictures of Stock of all Kinds*, representing different breeds and varieties. Prepared specimens of the heads of cattle, sheep, etc., illustrating breeds. Prepared specimens of poultry of all kinds.

3. *Collections of Agricultural Implements and Machines* —These are of great extent and variety, such as are in present use contrasted with those used by former generations, hundreds, and even thousands of years ago. Models. Drawings.

4. *Farm Products.*—Grains, fruits, vegetables, cotton, silk, tobacco, wines, wools, woods, flax, hemp.

5. *Soils*, *Minerals*, *Plants*, *Animals*, *Insects.*

6. *Fertilizers.*

7. *Natural and Artificial Anatomical Preparations.*—Anatomy of the horse, cow, sheep. Diseased parts and organs.

I was so much impressed with the value of these museums that I would be willing to labor long and hard to establish one in our own State. Can it be done?

In conclusion, let me say that public interest in agriculture is by no means confined to this side of the Atlantic. Agricultural fairs are quite as common in the British Islands as they are with us. There are probably one thousand agricultural associations in the German Empire, and those of

France number a membership of over a million. Clubs of farmers may be found in almost every considerable town. The governments of several nations send out agents to visit foreign countries and bring back improved stock, the best kinds of grain and fruits, and such new implements and machinery as they think worthy of trial. Encouragement is given in many places to the holding of winter evening schools for farmers; and courses of lectures on agriculture, by persons deputized by the proper authorities, are of frequent occurrence.

But I must add that while what has been done for agriculture in Europe has converted many sections into vast gardens, and made them more productive than any other lands on the face of the earth, it must be confessed that a large proportion of the men and women who do the work on the farms remain as stolid and as ignorant as their forefathers could have been a hundred years ago, and continue to use implements of husbandry and modes of culture handed down to them from long by-gone generations. It will require much time and great effort to lift them up to the level of the working men in this country. While Europe, therefore, may, in her agricultural progress, occupy, in some respects, a vantage-ground at the present, America certainly has a brighter prospect for the future.

Mr. KELLER, of Schuylkill. I believe that Prof. Wickersham has treated this subject so fully that there is but little to say on it, and merely say that I have always felt an interest that way—in the industrial education of our youth. I have frequently advocated the plan that the brain and the muscle should be educated together. Educate the rising generation to use their brains with their muscles, and they will live more by the use of both. If you give them all brain education, if they cannot live by brain-work honestly they will live by it dishonestly. Therefore, the schools of the kind described by the professor should exist all over the country. Not only every State, but every county and every township should have one. I think we owe this to our rising generation. We have too little of this kind of education, and the result is we have too many dishonest people around. If we would develop muscle more, instead of brain, we would have less vice.

Prof. ALLEN, of Tioga. There is no question of so much importance as the question of agricultural education in our schools. But the important question is, is it practical? Prof. Wickersham has asked three or four questions—he is in earnest—and we can solve them in America. This Board of Agriculture, with members from all over the State, it seems to me can put into practical operation in our own Commonwealth some of the questions presented here to-day.

There may be some present here who, three or four years ago, heard me deliver an address in the court-house in this town, where I showed that it is not only essential but practical to put into the schools something in the way of practical agriculture. I said "So poverty-stricken are our school-books and our schools touching all matters of farming, that if a man from the moon should come down into Pennsylvania and examine our text-books, he would never dream that we touched old Mother Earth with anything having the shape of a hoe; nor would he ever dream that we did anything except in the matter of simple percentage."

I am sorry that Mr. Wickersham did not allude to one other point. Why not put this subject to practical test at the three experimental farms in Pennsylvania, or at the county seats? There are ten State normal schools, in each of which you will find from two hundred to eight hundred students, most of them young men and young women preparing to teach. Why not divide this work up into ten parts? I think the fractions would be good. Why not establish this course of education in all these normal schools, which are all in agricultural sections, where we can reach young men and young women who are going out to teach? Of ten acres of ground at our normal school, I put in five acres to wheat. I took to the field our students, when we plowed the ground. I put into their hands (of such as chose to take it) a chain, and had others make the calculation; and then the land was measured off; and then I had the number of days given for preparing the crops, the time, and everything necessary about the subject of raising wheat; and when the time for drilling came on, I had them see the whole operation. On each acre I put two bushels of seed. I took one acre of the ground, and with the seed I put on five bushels of lime; with another acre five bushels of plaster, and with another acre five bushels of salt. Then I had the students there when they harvested. Those pupils could not help picking up incidentally things connected with the growing of wheat. If I could I could do it in such a small manner as this, why not extend it? If the State would give us some proportion of the money that is being distributed elsewhere, we could. Some money goes for purposes not half as laudable. If they would give us a part of the State's bounty, we would show our pupils how to teach others these practical methods.

You must know, Mr. President, that when we had a class examined on the cultivation of a field of oats, that those little fellows went to the blackboard to show how much oats to put in five acres, the method, and depth; and this practice in this institution goes on with limited means, and with no support, except what little we usually have had.

Why can we not, as a Board of Agriculture, go before the Legislature for assistance, or have it give us, at least, the prestige of sanctioning this kind of an education? If we could pass a resolution asking normal schools to prepare a cabinet of specimens, I think it would at least be complied with, and we would have thus growing up in our schools many of those things that the Doctor has spoken of. I throw these questions out only for the purpose of having them discussed further.

Mr. C. W. HEYDRICK, of Mercer. I was very much pleased with the reading of the paper. The suggestions made therein, I think, have a very important practical bearing upon the interests of the farmers of the State. We find great difficulty in getting skilled workmen on our farms; that is, men who are capable journeymen farmers. The reason, perhaps, is that there are no means of educating those men for the work they are attempting to engage in, or which they find to do upon our farms. We have to take the man as we find him, and educate him. It takes two or three years, and a great deal of care upon the part of the farmer, to bring him up to anything like the standard required. Then we are hardly capable of educating him, for the reason that we have been but partly educated ourselves. We know nothing, except that which we find by digging out, and after the experience of hard work. This enables us to see the advantage of the institutions of the old world that have been referred to here, and how much could be acquired by the location of similar institutions in our midst. For instance, if we had veterinary colleges, and could there get valuable and useful information in regard to our cattle, it would be of great benefit to us.

We are obliged to engage here in what is called "mixed" farming. We must mix cattle raising with grain raising, because our seasons are short, and the time limited. We cannot engage in raising all wheat or all corn; we have to engage in raising part of one and part of another; and we must have men who are capable of taking part in every department—not only in the culture of corn, but wheat, potatoes, fruit, bees, horses, cattle, and sheep. We want men not only able to plow a field, and put it in condition for a crop, but who can go into our stables, and take care of a sick horse, administering the medicine with skill. I have had this experience, and find it difficult to get a man who can be trusted. We get a man, and train him for one department, and, when through with that, train him for another; and by that time he takes his departure, perhaps. Then we have very limited knowledge for preparing men for various kinds of farm work. If we had a school, as spoken of, so that farmers would be able to have this knowledge imparted to their men, we could soon spread in that way a great deal of useful information, and benefits untold would be the result. I do not know how much I have lost from the want of knowledge of the proper treatment of horses and cattle, but it amounts to hundreds of dollars. I do not know how much I have lost from the want of skilled workmen on my farm. The main object of having journeymen farmers is the ability to carry on farming affairs without the immediate presence of the owner. Man "journeymen farmers" do not know how now. They want education, and that can be had by these schools spoken of by the President. Let the farmers be educated in the first place; then let the farmers' sons be educated, and let them in turn educate others growing up around them. Until then we are groping on in darkness, and losing a great percentage through ignorance that we otherwise might save.

Dr. W. S. ROLAND, of York. I, with another gentleman who has spoken, can say I have nothing to do with what has been said in the essay. It seemed to contain, or to cover, everything that I thought was important to insert for all the industrial educational interests of this great State. I myself, sir, had the honor, in a short address, in Philadelphia, to refer to something similar to what you have referred, viz: the establishment of a museum somewhere in the State of Pennsylvania. I think I suggested that the permanent exhibition grounds, in Philadelphia, or some room there, would be sufficient; and I thought in that address that a few public-spirited citizens in the agricultural societies ought to take hold of the matter; that such citizens might be the means of soon fitting up a museum. If those citizens cannot be found, I think the object can be reached more satisfactorily through the public schools than in any other way. As you are at the head of those institutions, and have a knowledge of all their workings, I think, perhaps, you will agree with me, that through the public schools, and especially those located in farming communities, would be the best plan of organizing and establishing a museum, such as you have referred to. That such a museum should be established, I think there is no question; but as to its locality, and other things, they will probably have to be considered hereafter.

Mr. H. M. ENGLE, of Lancaster. There seems to be scarcely a dissenting voice upon the advantages of the system given by the presiding officer. I mind only one little matter in reference to it. I think it referred to the establishment of a museum; and it put the question: Cannot some of these societies, or cannot the farmers do it? Or, however the question was. I suppose the question should be: *Will* the farmers, in any part of the State, take hold of this? They can. In my tour through the West, I made it my object to stop at Topeka, Kansas; and in looking through the department of agriculture, I was agreeably surprised in regard to what had taken place in that State. The "Old Keystone," one of the original thirteen, has nothing to compare with it, so far as my knowledge goes. The museum there was, in extent, and in every other respect, more complete than we could possibly expect in a new State like Kansas. There were specimens of almost everything imaginable—cereals of all kinds, fruits, minerals.

Entomology was very fully represented. Besides insects, the animals and reptiles of the State. There were exhibited not only the cereals of Kansas, but other States. So extensive was the display, that the room seemed to be too small for further accessions. But they are still adding continuously. The question was with me: How is it that a young State like Kansas is so far in advance of some of our old eastern States, especially our own State? I really felt humiliated; so much had been done there, and so little here. I still hope, if we do have to follow on behind that young State, that we will not postpone the matter much longer.

Dr. **JOHN. P. EDGE**, of Chester. It is within the power of every agricultural society in this State—I might almost say of every farmers' club, or grange, if you choose—to establish a scholarship, or create a fund belonging to the organization from which a scholarship should be established, in the State College. Then let the boys and girls, or members of the organization, have the privilege of competing for the enjoyment of that scholarship.

In regard to the teaching of agriculture in our public schools, unless the people should send their pupils to that school it would discourage the person who attempted to teach such an innovation in the curriculum. We have got somewhat out of the tread-mill, but we are not going as fast as we would like to go. Now, among the people is the place to accomplish these objects, or these ways for the education of the younger and rising generation.

Dr. **JAMES CALDER**, of Centre. I rise to speak upon the point just touched upon by the Doctor, (Edge.) Our friend from this neighborhood, who has just withdrawn, (Mr. Heydrick,) spoke on the propriety of cultivating hired men, and lamented exceedingly their lack of education for farm work. I felt sad, when that gentleman was speaking, over the lamentable fact that there is an opportunity committed to the farmers of Pennsylvania to have their sons and daughters well educated and prepared for their farms, and that they utterly refuse to avail themselves of it. I have no desire to enter into a discussion on the State College. I will intentionally avoid anything that will excite discussion, and I hope you will regard me as honest in the declaration; but the fact is, that the trustees of the State College did not elect themselves. The trustees of that institution, if you take the Governor and Professor Wickersham, and three or four gentlemen who are made trustees by a general law—they are trustees because they are certain officials of the State—if you take them away, all the other trustees are elected, not by themselves or their associates, but elected by the farmers of Pennsylvania. How many men in this room know that to be the fact? Yet that is the fact. Farmers of Pennsylvania, organized as associations in the several counties, are the voters to select the electors to elect trustees for the college, according to the charter of the college; and the trustees go out every three years, so that in three years the whole institution could be remodeled. All the present trustees could be turned off, and others elected, in the three annual elections, if the farmers so desired and would make the effort. If the president of the college is unfit for the position in the eyes of the farmers, there is nothing to prevent his being turned out. All that is essential is, that they shall elect three delegates to come to the college at the time of the annual meeting, the last Wednesday in June. Send three men to the college, and let them ask about the financial management, and you will find that every book, closet, and drawer will be open for inspection. Let these delegates come and ask for full information, and it will not be given in a niggardly way by any of the officials. Then let them put in one third of the board of trustees, of such men as they will have confidence in. Let them put them in, in this way, for three years There is no doubt that Professor Wickersham and the Governor, and the other ex-officio members will agree with the trustees you elect; but if not, at the second election you will have a majority, and in three years you could have all the elected trustees. Yet what is the fact? I am ashamed to confess that when we come to our meeting the farmers have so little interest they do not even come to the election, and the farmers of two or three neighboring counties do all the electing. I have been there, I think, going on nine years, and in that time we have had but one student from Mercer county. Now this is simply outrageous—having hundreds of acres, and $30,000 a year income, with agricultural, scientific, and classical courses, and all these things belonging to the farmers of Pennsylvania. If the farmers of Pennsylvania feel that the pupils there are not being educated in the interest of farmers, they can change these matters, if they see proper. Yet, with all these advantages for education, with this want of expert farmers here, what is done? It is altogether too bad; and I throw this out as an earnest appeal to you, that you will look at that college, and come in your official capacity, and if you find things that meet your disapproval, that you will frankly say so, and use your power to make them such as they ought to be. I do not only invite, but urge you to come.

Prof. J. P. **WICKERSHAM.** I think it is possible to introduce a good deal more instruction in agriculture, and the elements of this science, or that which relates to this science, in our common schools than is done. But really very little has been done. I am not at all so sanguine that what is done in the Old World can be done here. As I have already said, the schoolmaster there lives in his school-house. The school-house and the dwelling are one, and he has from three to six acres of ground attached to the premises. Here the school teachers not only do not live in the school-houses, but they are not so permanent as there. There, when a teacher is fixed in a school, he is just as firmly fixed as a physician is here. He cannot be put out by a board of directors; he stays, unless by improper conduct, or gross negligence, he forfeits his right. He is a teacher for life, or during good behavior, when he is elected to a school. Of course we have not those things here, and therefore agriculture cannot be taught in the United States as in the Old World. But it seems to me something may be done. Agriculture is the great and controlling interest of this country, and it does seem to me that something can be done for these schools in this direction. I have a mind to begin. I am glad that one of the heads of the normal schools is here; I wish they were all present. I would have to say to them that hereafter they shall give instructions in the science of agriculture, as applied on the farm. I shall hope that not only love for the farm but for farm work will be so infused into the normal school scholars that when they go out into the public schools they cannot help teaching it. Any teacher can find opportunity to give oral lessons. He can interest the children in the crops, and incite them to a desire to know about growing crops. There is nothing more interesting. How foolish it is for us to spend weeks and months and years teaching our little children to study in the atlas the towns, rivers, and mountains of Africa and Asia—things that are forgotten in a year. You go into our schools, and you will see the little students absorbed with questions about Europe, Africa, and Asia, to be soon forgotten. So with the abstractions of grammar and arithmetic. Why not take up instead some of these *live matters*, even if our children do not become farmers? I mean to begin, so far as my influence goes, in the normal schools; and then they will go out to teach others.

I appreciate what Dr. Edge has said as to public opinion. But we want to manufacture public opinion; and if we can introduce this subject into one school in a county, we can gradually extend it to others, thus elevating this interest, and supplanting those branches that our scholars are so often stultified with. I say this, standing where I do; and I do this because I have done everything I had the power to do, in making these changes; and I mean to continue on doing this work until I die.

I want to say one other thing. Since this Board met last, I have been down to the model farm in Chester county; and while in Indiana county, I took a look at the model farm there, and I am compelled to say that it is what not may be styled a model farm. The one in Chester county is managed well in many respects. It is a good place for farmers to go, and they can learn many things there. Very valuable experiments are taking place. The model farms in France are where young men are instructed to be farmers; and I wonder if it is not possible for some of the sons of farmers here to go to a school in which to learn something practically of agriculture? Take this farm in Indiana county, lying out loose and useless, with great capabilities. I should be glad, indeed, if the trustees of this college, or this Board, would set to work and make it such as it might be made. I know enough about farming, I think, to know that it can be made a model farm, where young men might go and spend three or six months, or a year, or three years, in order to learn how to farm in the most skilful manner. I know they utilize the farm at the State College, and to a considerable extent; and I know they do not, in reference to one of the other two farms. One of those other farms is tumbled down into a state of ruin almost. That in Indiana has not a model building connected with it. There are no model fields, and no model work of any kind done. And yet the State owns it. It is ours; and we are doing nothing with it. Why do not the farmers in this State rise up, and say it shall be put into condition, and make a model farm, to which farmers may go as the pilgrims to Mecca, to see what can be done there; and then send their sons, in order that they may know what perfect farming is? Then, if they want the science of it, send them to the State Agricultural College. You should not forget to store the mind; but first skilled laborers on the farm; then practical farmers, and then those great agricultural schools, where they have a course like I outlined to you, spending three years in the work of theoretical agriculture and practical agriculture combined.

Now why can we not put agriculture at the very head, where farming can stand as a science and an art; where practical agriculture can be a model in fact, and encourage our boys to learn practical farming of the very highest order? Then can we not establish, in addition to these places, model farms in our counties, for the purpose of giving a practical farm education?

Mr. M. C. **BEEBE**, of Crawford. I think it was in 1854, in looking over the reports of the common schools, that I noticed some eccentric school superintendent commenced his report with something like this: "The life or death of the school is the teacher." When I reflect upon the extent of our population; upon the vast subjects that have absorbed their ideas; upon the recent war, and the neglect of agriculture consequent upon it, I am not at all surprised that we have not made any further progress than has been made during the length of time we have had. I recur now to the reports of our State Superintendent, the head of the vast educational department of the Commonwealth; and while I stand here to-day hearing the ideas I have heard, and those ideas earnestly and strenuously advocated, I do not remember many years back of any thing having been said about this department of education. In fact, it seems to me, a few years ago we were running into abstracts—running the whole educational system of Pennsylvania into a grand system of abstractions, and embracing everything in that line, even down to all the dead languages. I rejoice exceedingly that a change has come. I apprehend so long as that was public sentiment that our friends, sitting here as a State Board of Agriculture, could not by any possibility, (until this sentiment was changed,) ever succeed in agricultural colleges, or divisions of agriculture, or succeed in a patronage that would give it the standing that your friend desires. We cannot accomplish these things without public sentiment. I am not blaming communities. This matter must be brought before them. We must explain and defend; and we must have a Legislature that appreciates, and is willing to do something in that line before any general action is taken; and if we can succeed in getting the first introduction of agricultural text-books into our schools the first year, we will have accomplished that much. Let us at least have methods; and then the practice. Then we shall be able to go on, perhaps, as we desire; though possibly not.

I heard one gentleman remark, when our friend was speaking of cultivating the brain and the muscle at the same time: "Ah," said he, "that is the question. Just so long as those peasants have this kind of an education in Europe, they will work; when they get brains, they will not work." I do not know but what that is the result here. I do not know but what I have seen men who were almost tramps who were graduates. I have felt that that is one of the results, probably. It is the theory, if not the practice, to say the least. But, sir, notwithstanding this, I know that the ideas which Prof. Wickersham has brought with him from Europe—for he is laden down with them, and he has presented them clearly and fairly—that they will not be without some legitimate results. I know that the last Governor of Pennsylvania (John F. Hartranft) cherished, as one of the dearest desires of his heart, an education to keep people from crime and idleness. Although he has passed away from the gubernatorial chair, I cannot help but think of the force of the Governor's theory, and that, if it is ever carried out, we shall have something to our advantage.

I do not despair that Mercer county has not sent out students to the State agricultural college. She is just like many other agricultural counties of the State. I have no doubt that many look upon the practice there with little favor; that it is a degradation to labor. So long as that is dominant, we shall make very little progress. An intimate acquaintance of mine sent his son to one of the most practical institutions in the United States, he thought. During a vacation, the father went down town with his son to buy some chickens, and said to the young man: "You take them home." Said the son: "Do you mean that?" "Yes; I mean it," said the father. "If there is any degradation about it, I will take them all home myself. But if I don't, and you cannot, I would advise you to find the judge of our county in town, and he will take them up for you for five cents." Said the son: "I don't mean any disrespect; but that is not what they do at the school where I go. I would have no respect with my fellow students and professors, if I did this there." How is that going to work with our children?

I think I can see where this is being rectified by individual effort. I went up to the Erie county fair, and one of the best departments I saw was what was called "natural history." Some of the pupils of the schools had gathered up specimens for this purpose, and in the collections were all the woods, all the leaves, all the plants, and all the cereals of Erie county. I think it was the best thing at the fair. If I were to visit a school to-day where education was practically taught, I should expect to find similar work going on. I mentioned it to the professor of our school. Said he: "It is exactly what I have determined upon, and I shall do it this very season." I have already gone to several others with the same object in view. I merely mention this as an incident. If we can start in with the next session of the Legislature, in the meantime sending to our professors and school boards hints on these practical subjects, we will have made that much progress. I shall be satisfied if we can do anything like making progress in the next ten years.

WHEAT—ITS STRUCTURE AND MODE OF GROWTH.

BY THE SECRETARY.

"There is obviously need of much more investigation and definite knowledge concerning the phenomena of vegetable nutrition and development, and it may be well to remember that we are everywhere surrounded by objects, for scientific research which demand our utmost talent, patience, and skill, but are sure to give ample and profitable results to every diligent inquirer. We are often inclined to encourage ourselves to remain in ignorance and idleness by dreaming of grand opportunities for study in some far off town or place; but let us keep in mind the fact, so familiar to every thoughtful student of nature, that within the limited circle of our vision lie concealed more mysteries than with our best endeavors we can ever solve."—*Prof. W. S. Clark.*

Of the many phenomena which everywhere surround the farmer, we have selected that of germination and growth as not only one of the most interesting, but also as one of those with which he most frequently comes in contact and usually looks upon very much as he does the operation of breathing or walking, often not thinking of the little world of mystery which is involved in the seemingly simple act of germination, or the still more complicated one of plant growth and development. In order, if possible, to endow our subject with a greater degree of interest, we have selected the special subject of the composition, germination, and growth of wheat, and shall endeavor to exclude, as much as possible, all scientific terms and nomenclature.

There can be but little room to doubt that in the economy of nature the primary object of the formation of the seed is to propagate the species; and that its secondary object is to furnish food for the young plant or germ until it is able to obtain its proper supply from the soil and atmosphere, and that the use of the grain as food is in no way connected with these. This being admitted, we may very reasonably expect to find it composed of two distinct and different portions, one having in view the furnishing a germ from which the future plant is to start, and the other containing the stored up food for the tender plant until it is able to forage for itself.

With the aid of chemistry we can readily draw the dividing line between these two portions, and with the same aid we can readily explore the store-house, test its contents, and, in great measure, examine into all the changes which take place before the apparently crude material can become fitted for plant food; but when we come to investigate into the causes at work to produce certain known effects in the other portion, we at once find that we have reached a point beyond which we cannot go, and a condition of which we can form littte more than a vague conjecture. We then meet with that unsolved problem of life, and into its mysteries we cannot penetrate. We only know that when certain conditions have been complied with, and certain surroundings furnished, a change commences in the portion containing the germ; one set of organs shooting out, pass downward into the earth, and another set shoot upward into the air; but why these take their respective courses and perform their allotted functions without error or fault, we cannot tell; and yet we are forced to admit that the success or failure of the wheat crop, in a great measure, depends upon these results; and the happiness or misery of many depends upon the proper carrying out of laws and the proper performance of functions which we are not able to understand properly.

Structure.

In its structure, our sample grain of wheat exhibits many peculiarities which escape the eye of the observer, and are only presented under a powerful microscope and to the trained observer. To illustrate the outer arrangement of the grain, we cannot adopt anything better than the diagramatic (Fig. 1) view given by Mrs. Lou Reed Stowell, of the University of Michigan.

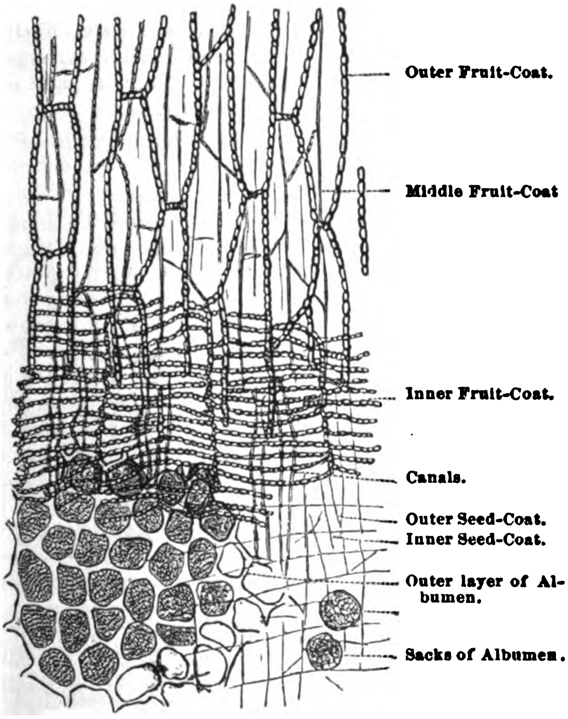


Fig. 1. Showing the different Coats of Wheat.

In describing this view, Mrs. Stowell uses the following language:

"Any of my readers who have examined the wheat with the microscope know how difficult it is to get the first and second fruit-coats apart. They almost always are seen together, as in the figure, while very generally the round cells of the albumen are seen together with the different fruit-coats, particularly with the inner fruit-coat. When the outer fruit-coat is examined with the microscope, and is in focus, the middle coat is not seen distinctly; occasionally is caught a glimpse of the beaded structure. Very frequently the three fruit-coats are together, as in the figure. Just beneath the third fruit-coat are seen the canals. The two seed-coats seen just below the canals, and at the lower right-hand corner of the figure, show as distinctly as they are generally seen. Frequently there is no appearance of cell structure in either of these coats. Immediately below the two seed-coats is found the outer layer of albumen, seen at the lower left-hand corner of the figure. By the openings around the edge of the layer, we see that the granular matter is contained in sacks. Two of the sacks have floated out, and are seen as distinct from the coat."

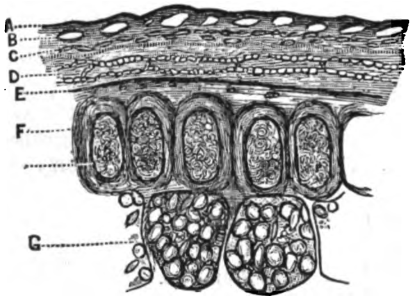


Fig. 2. Cross-Section of Wheat.

Fig. 2 represents a cross-section of a grain of wheat, which more plainly shows the arrangement of its several portions. *A* shows the outer or protecting coat; *B*, the opening made by the cells of the protecting fruit-coat; *C*, the smaller cells of the second fruit-coat; *D*, the peculiar formation of the cells of the third fruit-coat; *E*, the two seed-coats; *F*, the outer layer of albumen cells, arranged perpendicular to the surface, and *G*, the regular starch cells.

The peculiar formation and shape of these starch grains is exhibited by Fig. 3, which shows the three classes of cells.

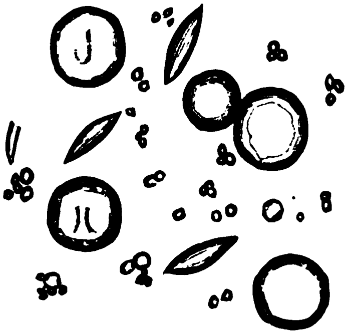


Fig. 3. Starch from a Grain of Wheat.

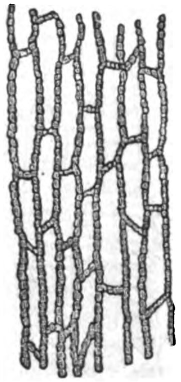


Fig. 4. Epidermis or First Fruit-coat of Wheat.

Returning to a description of the outer surface of our sample grain, we have in Fig. 4, the peculiar formation of the outer or first fruit-coat, the peculiarities of which the author thus describes:

The outer fruit-coat or the epidermis consists of a single layer of cells, (see Fig. 4,) similar in appearance to those found in the epidermis of the straw—long narrow cells, with a strong cell-wall, looking something like a string of beads. An important thing to remember is that the longest way of the cells is with the length of the grain. About the center, that is, midway between the two ends on the surface, these cells are in length nearly three times the width, while, as they approach either end, they gradually grow shorter and rounder. Occasionally stomates are found in the epidermis; but not regularly, as in the straw. At the apex of the grain, and growing out from this layer of cells, are the long slender hairs seen in Fig. 5. "A." shows the epidermis and the way the hairs are embedded in the cells. These hairs are composed of a single cell, with very thin cell-walls, which leave quite a cavity in the center, as seen at "B." This cavity in all probability is filled with gas of some kind, and, if we estimate several hundred of these hairs on each grain of wheat, which is by no means too large an estimate, would it not be right to wonder if the breaking up of these hairs, and the escaping of the gas, might not be sufficient to explain some of the mill explosions of the present time? With this thought in mind, we obtained a short time since some of the dressings left after the flour had passed through a middlings purifier, and were surprised to find such a large per cent. of the mass to consist of these hairs. Nearly half of the entire quantity was composed of these fine delicate hairs, that are so light and inflammable. Chemistry teaches us that almost any dry material, when powdered and mixed with air in just the right proportion, will explode, if a flame is brought near. Now, these hairs are so light and dry that they float in the

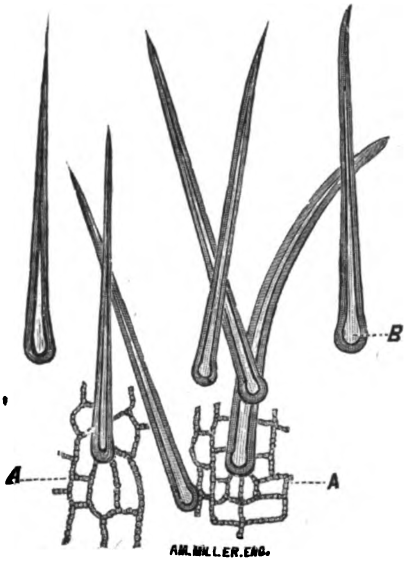


Fig. 5. Hairs found at the end of a Wheat Kernel.

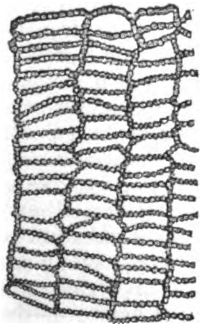


Fig. 6. Third Fruit-coat of Wheat.

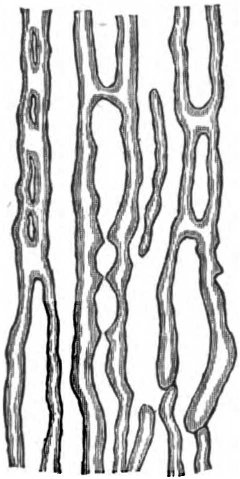


Fig. 7. Canals found on the inner surface of the Third Fruit-coat of Wheat.

air easily, and they burn very readily when thrown into the air over a gas-jet. If chance has mixed this dry powder at just the right proportion with air for an explosion, and, if chance has brought a lighted lantern or a flame of any kind in contact with the mixture, who can say what would be the result?

Fig. 6 shows the third fruit-coat and the peculiar arrangement of its cells, which, it will be observed, is their greatest length at right angles to the oblong cells of the outer or first fruit-coat, and, also, at right angles to the cells of the ***Mesocarp***, or second fruit-coat.

Fig. 7 shows the arrangement of a layer of cells, which are found firmly attached to the under side of the third fruit-coat, and which very materially assist in protecting the interior of the berry.

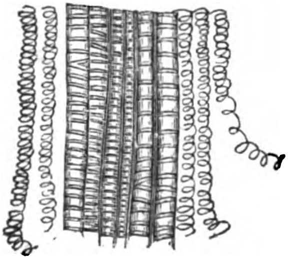


Fig. 8. Spiral Vessels found in Wheat.

"If you take a grain of wheat, and break it open longitudinally, breaking it in the crease made by the deep groove, and examine the edges of the epidermis as they fold over in this groove, you will find a line of deeper color than the rest of the wheat grain. If this dark line be taken out and treated with potassic hydrate, and examined under the microscope, a delicate vascular bundle will be seen. (Fig 8.) Another sign of strength in the grain. The spiral vessels are seen plainly, as they uncoil under the action of the re-agent, and seen on either side of the figure. This vascular bundle is seen plainer near the center of the grain than at either end."

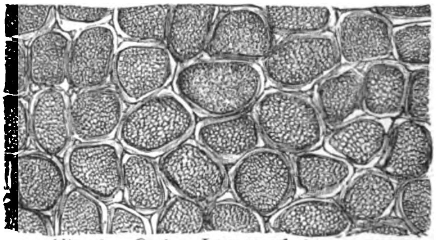


Fig. 9. Outer Layer of Albumen.

We have disposed now of the woody part of the grain, and have just reached the layer of cells, which is possibly of the most interest to millers. A layer of large, nearly square cells, with very thick walls, and filled with fine granular matter. (Fig. 9.) The cells are $\frac{1}{20}$ of a millimeter ($\frac{1}{500}$ of an inch) in diameter, and quite uniform in size. The cell walls are composed of several layers of cellulose, presenting somewhat of a laminated appearance under the microscope. These layers can be separated from each other quite distinctly by boiling in water for several hours, or in a solution of caustic potash for a short time. The sacks contain nitrogenous substances, and contain them in much larger proportions than any other part of the grain. If any means could be employed by which the grain could be divested of all its coats, excepting this last, and this last coat could be treated in such a way as to separate the nitrogenous sacks from the framework holding them, and then have the sacks form a part of the flour, we would probably have the finest and purest flour possible. The process of scientific milling has made such a great advance, during the past twenty-five years, who can say, but ere the next twenty-five years pass, we shall have these microscopical sacks of nutrition separated out from the woody part of the grain. The gluten, or nitrogenous substances, exist in very minute particles, about $\frac{1}{600}$ of a millimeter ($\frac{1}{15000}$ of an inch) in diameter. They are insoluble in water, alcohol, and glycerine, and are not affected by iodine or potassa. Ammonio-nitrate of silver turns them a dull yellow, while a solution of carmine turns them a bright yellow. Nitrogen is found only in cell contents, and is never found in cell walls.

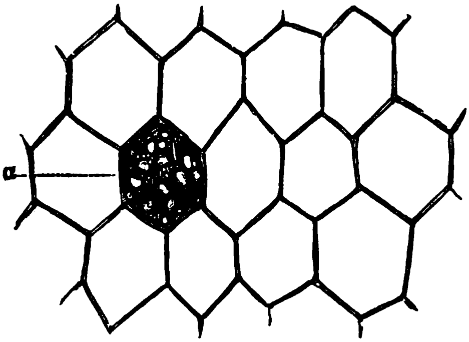


Fig. 10. Hexagonal Cells from the Central Part of a Grain of Wheat. a, Shows a Cell filled with Starch.

Inside of the layer of albumen is found only one structure until we reach the embryo, at the base of the grain. It is composed of large, thin-walled hexagonal cells, loaded with starch, (see Fig. 10.) To see these cells plainly under the microscope, a very thin section must be cut from the central part of the grain, with a razor, or a sharp knife, and then washed off carefully, with a camels hair brush, so as to remove the grains of starch, when we find a delicate white structure, resembling a honeycomb, in all except color. At the center of the grain, the cells are the largest, and are quite uniform in shape and size, measuring nearly $\frac{1}{10}$ of a millimeter ($\frac{1}{250}$ of an inch) in diameter. At the surface of the albumen, the cells are quite long and narrow, and lying in such a way that they appear to radiate from the surface toward the center. The walls are delicate and nearly transparent, showing under a high magnifying power the different structures or layers of cellulose. The cells are loaded with starch grains, as seen at *a*, Fig. 10.

Germination and Growth.

To insure successful germination or sprouting, we find three conditions needful—either of which being absent, the result fails entirely, or is imperfect in proportion as the agent is withheld. These agents are moisture, heat, and air. Until water has been absorbed, no change can take place in the particles of the grain. In the presence of heat and air alone the grain will remain unchanged for an indefinite length of time. In the presence of moisture, even though air and heat be partially excluded, germination may proceed slowly; but in the presence of too much water, germination, after reaching a certain point, is checked, and death from starvation ensues. If moisture is afforded in insufficient amounts, the seed may sprout or malt, but will soon die, because the stored up food of the seed and soil cannot be utilized.

The amount of heat needed to secure healthy germination will vary very much with the nature of the seed, but we may, for practical purposes, place the extremes at thirty-four and one hundred degrees. With some few kinds of seeds germination will go on at any point above thirty-two degrees, and below one hundred and fifty degrees; but such cases are so rare that we need hardly enter on the subject. In the absence of moisture, too great an elevation of temperature will destroy the germ of our wheat grain. A temperature of one hundred and seventy to one hundred and eighty degrees will effectually accomplish this, and warm water, at one hundred and forty-five degrees, will produce the same effect—of course supposing that either is kept up for any great length of time. Seeds, though in the presence of moisture and accompanied by a considerable degree of heat, will fail to germinate if air is excluded. Our soils are full of the seeds of weeds, which having been buried deeply and the air excluded, fail to grow, but as soon as brought to the surface, germinate freely. While air is absolutely necessary to successful germination, yet we find it to be necessary to either partially or entirely exclude light.

Just how deep to plant to insure the admission of the proper amount of air, moisture, and heat, and yet sufficiently exclude light, is a nice problem not yet fully solved. A European experiment gives us the following results, which may, however, need some modification before we can accept them as conclusive for our crops. The result of careful planting at different depths is given as follows:

Depth.	Reached the surface in.	Per cent of plants.
.05 inches,	11 days,	87
1 inches,	12 days,	100
2 inches,	18 days,	87
3 inches,	20 days,	75
4 inches,	21 days,	50
5 inches,	22 days,	37
6 inches,	23 days,	12

It is claimed by some, that germination is not only affected by the amount of light; but, also, by its nature or color. Some authorities claim that, however closely the laws as to moisture, heat, and air have been obeyed—no matter how nicely the depth of planting, character of the soil, or the adaptation of soil and manure may have been carried out—that seeds under blue rays will germinate more quickly, and attain to a much stronger plant growth, than under light of any other color; and that yellow light will effectually prevent or retard germination. The evidence upon this point is, however, still vague and uncertain.

Having fulfilled, as nearly as possible, the laws which govern rapid and successful germination, we may proceed to consider the changes which take place in our specimen seed after we have placed it in the soil.

After a length of time, which will vary with the completeness with which we have carried out these laws, our grain begins to swell by the absorption of moisture through its partially insoluble covering, and that portion which we have styled the germ or embryo bursts through the outer coating and liberates two sets of organs, one of which, passing upward, eventually becomes the plant, and the other, striking downward into the soil, and commencing the collection of nourishment even before the supply stored up in the seed has been exhausted. No matter how often we may turn and return our seed, there is no clashing in the duties of these two classes of organs. Each one has its duties to perform, and in so doing makes no mistake; we may, by continually turning the seed, exhaust one or both, but neither will forsake its duty for that of the other.

Before the store of nourishment in the seed is exhausted, this single root commences its work of foraging, and soon throws out minute filaments, which are the true roots of our plant. The number and vigor of these will depend very much upon the mechanical condition of the soil, being much more plentiful in finely divided soils. These side shoots are thrown out near the grain, and as soon as they are fairly established the primary or main root, having fulfilled its mission, dies, and our tiny plant commences a new life under a new arrangement which must last until it either dies or perfects its seed.

Each root terminates in what scientists have termed a *Spongiole*, and it is on these spongioles that the plant depends for its food. They take the place of a mouth, and to them belongs the duty of selecting and absorbing the food. In the soil, and in close contact with them, they find both nutriment and poison, or they may find both in the same compound. By a power not yet fully understood, they eliminate and absorb the food and reject the poison. In order that this food may be made available by the plant, it must be in a state of solution in water, but the water must not be in excess or the plant will starve from the weakness of its food and the exclusion of air. As soon as the roots come in contact with stagnant water they fail in their forward course, the plant becomes stunted and sickly, not only from a want of proper food but also from an over supply of an improper kind.

It has also been claimed that the roots in addition to selecting and absorbing the food, have also, by another set of organs, the duty of excreting in casting off the waste material which may exist in the circulation of the plant.

Leaving for a time the consideration of the physical changes which have taken place in the seed, we will direct your attention to certain chemical changes which have been going on, and which, when fully understood, will explain not only the physical changes, but also some of the failures in germination which are so common.

As has been stated, a certain amount of air is absolutely essential to successful germination. De Saussure proved by a series of experiments, that germination would not take place in any mixture of gasses in which oxygen did not exist. As soon as moisture, accompanied by a proper amount of heat, has had time to act upon the albumenous portion of the seed certain changes take place which result in formation of a substance known to chemists of *diastase;* the manner in which this is formed is still in doubt, but all agree that its formation will not go on in the absence of oxygen, and that the changes which produce it are the primary steps in germination; until it is formed the substance of the seed cannot be made available for the nourishment of the plant. The function of *diastase* is to convert the starch of the grain into sugar, and Liebig asserts that one part of diastase will convert two thousand parts of starch into dextrine (gum) and sugar. At a temperature of sixty-eight degrees he produced 77.64 per cent of sugar from one hundred parts of starch by the use of twelve and a quarter per cent. of diastase. As the temperature was increased the amount of diastase was diminished until he reached the proportions first named. This furnishes us with the reason why seeds either fail to germinate at a low temperature, or having germinated fail to grow properly; the sugar and dextrine are not formed fast enough to supply a vigorous and healthy growth, and the plant starves to death.

We have before alluded to the effect of various depths of planting upon the growth of the plant; but, with the wheat plant, these rules are, by no means, arbitrary, for in the formation of its roots there exists a peculiarity which, in great measure, prevents it from being amenable to the laws which govern the depth for planting other seeds. Practical men know, that, in many cases, good crops of wheat have been obtained by plowing the seed in with the manure to the depth of four or five inches—by drilling the seed in three inches deep—or by simply covering the seed with a light harrow. This will apply only to that class of plants of which wheat and rye are the type. The grains, if planted at different depths, will, of course, reach the surface after different periods of time have elapsed. The plumules of these planted deepest will, of course, be last in reaching the surface, and will, also, be less vigorous than those having less earth over them. This latter fact is, probably, due to two reasons: first, the greater depth of the seed prevents the free access of oxygen, and hence diastase, and its resultants, sugar and gum, are not formed fast enough to supply the cellular tissue necessary to reach the surface; and second, the supply of food stored up in the grain is limited, and may be exhausted before the leaves are formed; and until they are formed no food can be utilized from the soil.

If our readers will, at the proper period of growth, examine the young stalks of wheat, (no matter at what depth they were planted, provided the plumule is two or three inches above the surface,) they will find, at about one inch below the surface, a small swelling or knot on the stem. In time, this knot sends forth a new set of roots, which continue to grow and spread near the surface, until they are sufficient to furnish all the nutriment needed by the plant, and the stem, and primary roots below, having fulfilled their function, die. After the formation of these secondary roots, that portion of the stem from which they issue continues to enlarge, until, reaching a certain point in its growth, another plumule is developed and reaches the surface. This is soon followed by others, until, instead of the original single plumule, we have a number in a cluster, all seemingly alike, and with equal chances to grow and fulfill their proper duty. This "tillering" process is of primary importance to the wheat grower, and will vary with the kind of wheat, nature of the soil, manner of planting, amount of manure, character of the season, and some good authorities claim, with the depth at which the grain has been planted. As a rule, the larger grained red wheats tiller most, and the smaller grained white wheats least. In a well-prepared and well-manured soil, these tillers will be in their greatest abundance. An early fall or early spring planting will, (in the absence of fly,) promote their growth. According to our best authorities, planting at a depth of about two inches will be found best for their production.

That this tillering process is not entirely due to the kind of wheat, preparation or manuring of the soil, season, or depth of planting, is proven by the fact that it can be almost indefinitely increased by thin seeding and careful selection. By a continued careful selection, this quality can be *bred* into the grain, so that when planted under precisely similar circumstances, the carefully selected grain will throw out many more of these supplementary stalks than ordinary grain, without selection. By many years of careful "breeding" and selection, Mr. Hallett, of Brighton, England, has produced a species of wheat, in which the "tillering" process has been so "interbred" and increased, that when put in with an ordinary turnip drill, in rows nine inches apart, with the grains nine inches apart in the rows, will produce a good stand of straw, and often over forty bushels of grain per acre, and has produced sixty. From some cause not yet fully explained, these supplementary stalks or tillers can better withstand the force of the wind than the primary plant; the thinner we can seed, and still secure a good stand, the better our crops will stand up against storms and heavy manuring.

The observant farmer need not be told that his crop does not altogether depend upon the length of the heads, amount of straw, quality or amount of manure, tillering from the primary root, for while these all may in good measure be carried out, he may yet fail to obtain a remunerative crop. Under seemingly similar circumstances, the crop will vary in different seasons. To those who study such items, the cause or causes of these variations are interesting. In an attempt to explain these causes, we shall ask our readers to follow us in a partial analysis of a head or spike of wheat. In this examination, we find it to be broader in one direction than the other, having its grains arranged in chests or clusters at right angles to its length; at the base and near the point of the head we find these chests or clusters containing but one or two grains, while near the middle of the ear the number is increased to two or three grains. In unusually prolific years, like the past one, we sometimes find four grains in the center clusters on either side of the head; in years of a partial failure of the crops, the central chests seldom contain more than two grains, and those at either end are usually empty, or contain abortive grains. In such cases, it will be found that the failure is mostly confined to the chests near the point of the head, and even in prolific years the grain in these is sometimes abortive. These abortive grains often escape the notice of the farmer, because they are blown out with the chaff, but imperfect grains produced in the end chests may often be noticed. As in other plants, each grain of wheat is the product of a fertilized flower or blossom, and the measure of production (other things being equal) is the perfection of fertilization.

Observation will prove, that vigorous plants, on a well manured and well prepared soil, the blossoms or flowers are much more numerous than where the necessities of successful production have been neglected. Other things being equal, it is but fair to infer that an increase in the number of flowerets will be accompanied by an increase in the percentage fertilized, and, consequently, in the number of grains produced. In two plots, side by side—one carefully manured, prepared, and planted, and the other deprived of manure and proper treatment, although the same amount of seed may have been sown on both, the former will produce the largest amount of grain, but in both cases the length of the heads may have been nearly the same. A portion of this difference is, no doubt, due to the increase caused by tillage, but much of it is due to the increased number of flowerets produced and fertilized. This is proven by the fact that we see, on the heads from the well-cared-for plot, an extra row of grains, extending from the middle, upward and downward, for a distance varying, with the season and perfection of fertilization. In some special heads, we have found five grains in the middle chests, two in the lowest chest, and two in the second one from the point of the head.

Like the process of tillering, it would seem that the production of flowers and increased fertilization may be indefinitely increased by careful and long-continued selection. Major Hallett has, in this way, produced heads having eight grains in each, of three or or four chests, at or near the middle of the grain, or sixteen grains in a circle around the middle of the ear. In some cases, these heads were seven and three quarters inches long, and contained three and four grains in the lower chests, and one and two in the upper ones. Mr. Hallett's theory of selection was, that of all the stalks produced from one grain, there was one best stalk, which exceeded all the others, and that in the head produced by this one best stalk there was one best grain, which was the one to be preserved for seed, and the proper one to "breed" from. By pursuing this course for a number of years, he has attained results which have astonished English wheat-growers, and has, in field culture, by the use of a very small amount of seed per acre, produced over sixty bushels per acre.

Some of the more advanced English farmers have adopted the theory that perfect fertilization, in a great measure, depends upon surrounding circumstances at the time the pollen of the flower is in its proper condition. They claim, that if when the proper time for fertilization arrives, (or when the pollen of the flower is ripe,) a heavy rain storm occurs, a smaller proportion of flowers are fertilized, and a loss to the crop ensues. If, on the other hand, a brisk wind is blowing at the critical time, they claim that the proper distribution of the pollen is secured, and a good crop insured. In support of this theory, light ropes have been drawn lightly over the heads. The results of the production, in this artificial manner, of the effects of a slight wind, have been variously reported; and, in many cases, it is claimed that the increased product fully warrants the small expense.

Structure of the Straw.

Having now carried our ideal plant to the point of perfecting its grain it may not be amiss to go back and give some attention to the structure of the straw; but of its outward appearance we need say but little, as our readers are sufficiently familiar with this already. As in the structure of the grain, we quote the following description of the straw from Mrs. Stowell:

" If we take a wheat straw that has been soaking in water for twenty-four or thirty-six hours, and, with a very sharp razor, make a cross section, and examine under a microscope magnifying from seventy-five to one hundred diameters, we will be able to form a very correct idea of the structure of the stem. Only a part of such a section is found in Fig. 11. This being but a small segment of the circle, which, when complete, forms the entire circumference of the straw. The whole structure is made up of vegetable cells, only many are modified differently in order to fulfill some special object for which they were made.

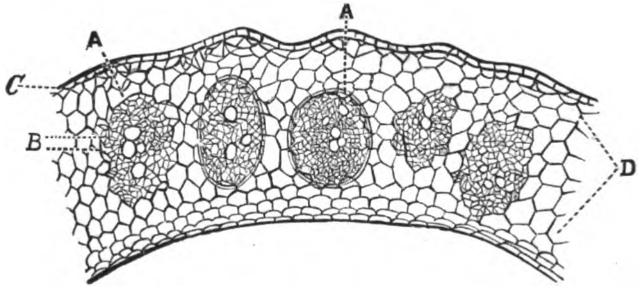


Fig. 11. Cross-section of Wheat Straw.
A. Vascular Bundles. *B.* Spiral Vessels.

" The principal frame work of the straw is built up of such cells as appear at *D*, very thin walled hexagonal cells. These cells are modified in shape as they approach both the inner and outer edge of the figure. At the inner edge we see regular four-sided, thin-walled cells; as they reach the outer edge we find the walls quite thick, and the cells, also, four-sided. The row of cells, as seen at *C*, form the epidermis of the straw, and is composed of a simple layer. The outer edge of these cells is quite thick-walled, and forms the cuticle. This cuticle is what gives the smooth polish to the surface of the straw. In some varieties of wheat this cuticle is much thicker than in others. If the season is a long, cold, stormy one, or if the wheat grows in a cold climate, the cuticle will be found to be thicker and more leathery. The darker round portions of the figure, as seen at *A*, are the woody portions of the straw, or, as they are called, vascular bundles. The fine cells forming the most of these bundles are woody cells, while the large openings near the center of these bundles are the cross sections of large vessels or ducts that run the whole length of the straw.

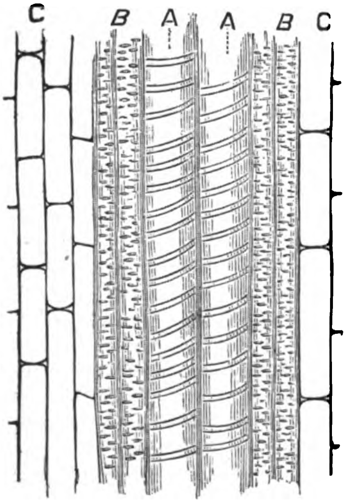


Fig. 12. Longitudinal Section of Wheat Straw.
Showing a Vascular Bundle. *A.* Spiral Vessels. *B.* Pitted Vessels. *C.* Regular Parenchymatous Cells.

Fig. 12 represents a longitudinal section of a vascular bundle. The cells shown on either side of this bundle, at *C*, are the fundamental cells seen in cross-section at *D*, Fig. 11. The cells at *B* are the woody portions seen at *A*, in Fig. 11. They have very peculiar little pits covering their surface

The large vessels at *A*, Fig. 12, are the same as those seen in the cross section at *B*, Fig. 11, only magified many times more.

The spiral bands, arranged so beautifully around these vessels, are very fine tubes, coiled around on the inside of the large vessels, and growing firmly to the inside wall. Water or moisture is carried the length of the straw by the spiral tube, as well as being absorbed through the cell walls.

"The only object of the woody portion of the straw is to give strength enough to the plant to hold up its head until the wheat is ready for the harvest. The spiral vessels and woody portions do not, as many suppose, carry the sap through the plant. The sap is carried right through the cell walls by absorption, principally by those cells found at *C*, Fig. 12, and at *D*, Fig. 11. In order for the sap to be raised one inch, it is obliged to pass through over two thousand of these cells.

"Fig. 13 shows the epidermis covering the outer surface of the straw. It has been torn off lengthways, and is the single layer of cells seen at *C*, Fig. 11. The long, narrow cells at *B* make up the epidermis as it covers the vascular bundles or ridges found running lengthways of the straw. The larger cells, at *C*, are found covering the grooves seen in the depressions in Fig. 11, between the vascular bundles. At *A*, we find peculiarly modified cells surrounding openings that are the regular breathing places, called stomates. The wheat plant must be able to breathe, to exchange gases with the surrounding air, to throw off a superfluous amount of moisture, or to absorb moisture from the atmosphere when the earth is too dry to supply its demands.

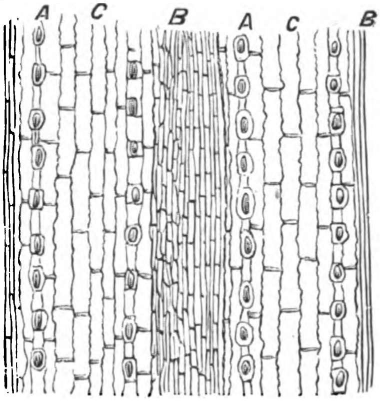


Fig. 13. Epidermis of Wheat Straw.
A, Rows of Stomates. *B*, Opposite, or over the Vascular Bundles seen at *A*, Fig. 12.

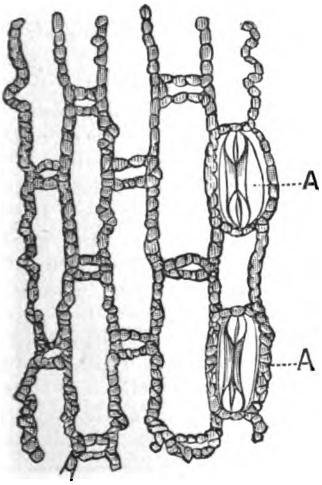


Fig. 14. Epidermis of Wheat Straw.
Same as Fig. 13, magnified more. *A*, Stomates or Breathing Places.

"These stomates are seen in Fig. 14, highly magnified. The dark line at their center, *A*, is where the opening occurs, here represented as closed. As the wheat is growing in the field if a dry, hot day comes, these openings will be found closed tightly, in order to retain all the moisture possible in the plant. If the day is damp, the little mouths will open as wide as possible to exchange moisture with the surrounding atmosphere. We have proved this many times by careful miscroscopic examinations at such times. Where this power of moving resides is not at present fully determined, but true it is these little stomates guard the life and habits of this plant as closely as the windows of a house protect the inside from the storm."

Having followed our ideal grain and plant through all the stages of its existence, and having shown many of its peculiarities of formation and growth, we close with the hope that its perusal will arouse in the mind of the reader a desire for information as to some of the so-called phenomena of nature which will lead to still further investigation on this and other channels which everywhere surround the farmer; if such a result has been attained we have accomplished all we intended, and will be well satisfied.

THE LAWS OF TRESPASS, AS THEY RELATE TO AGRICULTURE.

By GEORGE W. HOOD,* *Member from Indiana.*

Trespass, in its largest and most extensive sense, signifies any transgression or offense against the law of nature, of society, or of the country in which we live, whether it relates to a man's person or his property. But in the limited and confined sense in which we are, at present, to consider it, it signifies no more than an entry on another man's ground, without a lawful authority, and in doing some damage, however inconsiderable, to his real property. For the right of property once established in lands, it follows, as a necessary consequence, that this right must be exclusive. That is, the owner must have to himself, the sole use and occupation of his soil. Every entry, therefore, thereon, without the owner's leave, and, especially, if contrary to his express order, is a trepass or transgression. The Roman laws seems to have made a direct prohibition necessary, in order to constitute this injury. But the laws of England, justly considering that much inconvenience may happen to the owner before he has an opportunity to forbid the entry, has treated every entry upon another's land as an injury or wrong, for satisfaction of which an action of trespass will lie; but determines the quantum of that satisfaction by considering how far the offense was willful or inadvertent, and by estimating the actual damage sustained; and the same may be said to be the law with us to-day. That every entry upon land, in the occupation or possession of another, constitutes trespass, unless the act can be justified in the exercise of some legal or personal authority, or incorporeal right. If your land is not surrounded by an actual fence, the law incloses it with an imaginary inclosure, to pass which is to break and enter your close; and every trespass upon land is, in legal parlance, an injury to the land, although it consists merely in the act of walking over it, and no damage is done to the soil or grass. The mere act of breaking through the imaginary boundary constitutes an action of trespass, and is in violation of the right of property, though no actual damage be done; and where a person has a special privilege or authority to enter upon lands, to make seizure of goods, and he exceeds his authority, by breaking open the outer doors of your dwelling-house, he is a trespasser *ab initio*, and all his subsequent acts are trespasses, and his position is then the same as that of any stranger, acting without any color of authority or justification whatever. The same is true of a person who has lawful authority to enter lands for any purpose whatever, if he exceeds his authority by doing what he ought not to do, or what he had no authority to do, or if he stay longer than he had a right to stay. If one man throws stones or rubbish, or materials of any kind, on the lands of another, he is a trespasser, and will be held responsible for the act. To pour water, out of a pail, into another man's yard, or to fix a spout, so as to discharge water upon another's land, or to suffer filth to ooze through a boundary wall, and to run over another's close or yard, without his leave or permission, is a trespass, unless a right of way over the adjoining close, or a right to discharge water upon it, or a right for the passage of waste water and refuse through it has been gained. There is a distinction, however, between a direct forcible act of trespass and one which is merely consequential.

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*In deference to the unanimous request of the Board, Mr. Hood has consented to so enlarge the limits of this paper as to make it embrace such legal points as are of general interest to the farmer, including rights under deeds and mortgages, warranty of live stock bought or sold, the question of nuisance, &c., &c., and after making the paper an exponent of "the legal rights and duties of farmers," to publish it for general distribution.

If I erect a spout on my house so that the water turned into it from my premises falls directly upon the land of my neighbor, this is a tresspass; but if I erect the spout so that the water first falls upon my own land, and then escapes on to the land of my neighbor, this is not trespass, for it is lawful for me to erect a spout on my own house so that the water falls upon my own land, and, if I exercise ordinary care to prevent it from escaping on the land of my neighbor, but after the water falls from the spout it runs upon his land, I cannot be accountable to him in an action of trespass. If I build my house with the eaves projecting over the land of my neighbor, so that when the rain comes, it falls upon his land, trespass in this instance will not lie against me therefor, for although I built my house with the eaves projecting over on to the land of my neighbor, yet I did not cause the rain to fall, nor did it fall under my direction or control. The injury is not direct from the act, but in consequence of it, and a result thereof, and for such injuries the law has provided an action on the case, but not trespass as the remedy, (39 N. Y., 400; 6 Cush., (Mass.,) 70.)

But while there are many instances in which it has been held that mere trivial acts, such as the firing of a gun loaded with shot into a field, or the passing through the air in a balloon over the land of another, breaks the close, and thereby constitutes a trespass, yet these are instances in which actual damage can rarely happen, and of which the law, owing to its desire to be just to all, pays but little or no attention to, and hence we pass from this to that which is more common, and which is most important to consider, viz: Trespass by cattle and domestic animals.

If my cattle, sheep, or any animals in which the law gives me a valuable property, trespass upon your land, I am responsible for the trespass and consequential damages, unless I can show that you were bound to fence your land, and had failed to do it. And it does not matter whether my animals be in my own immediate care, or in charge of a servant, or in custody of some stranger, I am alike responsible for any damage they may do. But if my servant, without my knowledge, takes my cattle, and puts them in another's land, my servant is the trespasser, and not I, for his willful dealing with the beasts without my authority gains a special property in them for the time, and for this purpose they become his beasts. But if a wife thus deals with her husband's cattle, the husband himself is a trespasser, because the wife can gain no special property in them as against her husband. By the common law, a man who turns his beasts upon the commons or into an unenclosed lot of ground is bound, at his peril, to see that his beasts do not stray or trespass upon another's land; and when a man is bound by contract or prescription to repair a fence between him and another's farm, and he neglects to do it, and the beasts of another get on his land, this would be a good justification to an action of trespass brought by him. In such a case it is lawful for me to go on to my neighbor's land after my beasts, and drive them back on to my own land, and this would be a good plea in justification of the trespass, because it was made necessary on account of the default of my neighbor.

If I drive my cattle along the highway, and you have open, unenclosed land adjoining the highway, and my beasts enter your land, and eat the herbage thereof, and I come immediately and chase them off, you can have no action against me, because the chasing was lawful. So if my goods have been taken by you and placed on your land, I may justify my entry on your land for the purpose of re-taking them.

Where two persons have adjoining fields, and no hedge or fence between them, each must take care that his beasts do not trespass upon his neighbor, unless one of them has acquired a right or title by grant or prescription to have the boundary fence between his close and that of the adjoining proprietor maintained and repaired at the expense of the adjoining land owner.

Every man MUST use his own land, so as not to injure another, and as of common right and by common law one is bound not to let his cattle trespass on the lands of another, so he is bound to use those things which are his in such a way as not to hurt another by their use.

If a land owner, who has land bordering on a highway, neglects to fence the land, and a drove of cattle passing along the road gets into his fields, and thereby injures his crops, he must either drive them out himself or give reasonable time to those in charge to get them out. But whilst the common law required the owner to keep his cattle within his close, and their intrusion on anothers possessions was a trespass, yet it was provided by statute, in 1700, that the owner of improved land must fence them, both to restrain his cattle and shut out the roving cattle of his neighbor, and unless improved lands are enclosed by a fence the owner is in default, and cannot maintain trespass for damages by roving cattle, (55 Penn'a, 227,) and when it is the duty of a land owner to fence his land, he cannot recover compensation for damage done upon it by stray cattle, so long as his duty is neglected. (*Ibid.*)

Another way in which farmers are trespassed upon is by rabbits and pigeons, and against them the law has provided no remedy. If my neighbor encourage the growth of wild rabbits, and forms burrows for them upon his land, and the rabbits stray from his land to mine, this is no trespass for which the breeder of the rabbits could be held responsible, for when they have left his land they are not then his rabbits doing damage. Being animals "*ferra naturæ*," he has no more property in them after they have left his soil, than in the birds of the air, which may breed on one man's land, and destroy the crops of another. The only remedy for those whose crops are destroyed is in the destruction of the rabbits. Rabbits running at large, on a common, may be killed by any one who desires their destruction, and the same law prevails with regard to pigeons. If they come upon my land I may kill them, but I have no remedy against any one for breeding them. Dogs, too, often do damage by intruding or trespassing on your property, and by the common law a man is not considered to have the same valuable property in a dog as in horses and cattle, and it has been held that if a man's dog goes to his neighbor's garden and injures his crop, no action will lie, unless the dog is of a peculiarly mischievous disposition, so as to be unfit to be at large, and this too known to his master. If the master accompanies the dog he is a trespasser himself, and the damage done by the dog is consequential upon the trespass by the master. Owners of dogs in Scotland have recently been made liable for injuries done to sheep and cattle by their dogs, and all persons who harbor dogs on their farms are deemed to be the owners of the dogs, unless they can prove the contrary, and do show that the dog remains on their premises without their knowledge.

In Pennsylvania it is provided by statute that trespass will lie against owners of dogs for injuries committed by them to sheep, (7 Barr, 254,) and it is lawful for any person or persons to shoot or kill any dog found or known to be chasing or worrying sheep, or accustomed to do so, within this Commonwealth, without liability on the part of such person or persons to pay any damages therefor; and the owner of such dogs is liable for all damage done, or caused to be done, by every such dog or dogs. And to justify the killing of a dog under this act, it is not necessary that he should have been seen actually worrying sheep. It is enough that he has been observed to actually follow them with hostile intent, and that the owner knew of his propensity. (7 Harris, 359.) It has also been held that one may lawfully kill a dog found trespassing on his grounds, and within his inclosure, if he cannot otherwise protect his property from its depredations, (6 Penn'a, 318.) The owner of a vicious dog is bound to confine it, (27 Penn'a, 331;) and it is lawful to kill a dog by which one has been bitten, whether mad or not. (Add., 215.) Where the dogs of several owners kill and worry sheep, each of them is responsible for the whole damage in a joint action. (63 Penn'a, 341.) But in the State of New York, where two dogs of different sizes were found killing sheep, in the absence of direct proof, it was recently held that the jury were justified in finding that the largest dog killed the most. And where a flock of sheep is injured by fright the defendant is likewise liable for the injuries caused by the fright. (63 Penn'a, 341.) But to close the subject as to dogs, it must not be understood, by any means, that whilst you can lawfully shoot or kill a dog in the act of worrying sheep, you can therefore *poison* him, because that remedy is not to be resorted to under any circumstances. *Poison* is not to be thrown even to dogs, and the mere exposing of any poison for that purpose, whether the dog touches it or not, is in violation of the laws of this Commonwealth. Let farmers protect themselves as best they can against dogs, but I would say never resort to the secret and dangerous remedy of poisoning them. We have many instances in our State where valuable animals have partaken of the poison placed for the dogs, and considerable loss of property the result of this dangerous practice.

Another of the most annoying forms of trespass to the farmer, and the last one that I shall mention, is that of hunting and fishing. It seems that many persons suppose that, by force of some general custom, they have a right to hunt and fish over another's ground as they please, but this is a great mistake. How often it happens to the farmer, as he goes out to harvest his field of wheat, to find much of it trodden down and entirely destroyed by hunters and hunters' dogs passing through it and over it. How often they tear down his fences, open his gates, and leave down his bars, whereby his cattle escape to the highway, and become trespassers, perhaps, on the lands of his neighbor. Some suppose that because squirrels and rabbits and pigeons are not property, they have a right to pursue them anywhere, no matter whose possessions they trespass upon. At one time, it was held in England that it was lawful to follow a fox with horses and hounds over another's grounds, if no more damage be done than is necessary for the destruction of the animal by such pursuit; but, in the year 1809, a different doctrine was laid down by Lord Ellenborrough, who said: "These pleasures are to be taken only when there is the consent of those who are likely to be injured by them, but they must be necessarily subservient to the consent of others. There may be such a public nuisance by a noxious animal as may justify the running of him to his earth, but then you cannot justify the digging for him afterwards. That has been ascertained and settled to be the law; but even, if an animal may be pursued with dogs, it does not follow that fifty or sixty people have, therefore, a right to follow the dogs, and trespass on other people's lands." "Circular fox hunts," which but a few years ago were very frequent in some parts of Pennsylvania, are all in violation of this law, and are only sustained and sanctioned by the people over whose land the hunters pass by a tacit and and general consent.

When a man has an inclosed wood lot, which he has made inviting for wild game to come and take up their abode, no man has a right to enter there and destroy or kill any of his game without the owner's consent. A man would, in this instance, be as much of a trespasser as if he trampled down a portion of the growing grass or grain.

As to Fishing.

In all ordinary streams or ponds the right belongs solely to those persons owning the adjoining land. If the stream is navigable, the public have a right to boat up and down it, and fish from their boats, but have no right to go on shore and do it. In some States the law is, when a man has a pond of water on his farm, containing ten acres or over, the public have a right of fishing and fowling therein, and may pass and repass on foot through any man's property for that end, so they trespass not on any man's corn or meadow. But in Pennsylvania, we understand the law to be quite different. A pond on a man's farm, no matter its size, belongs to the owner of the farm alone, and any passing to and from the pond, without permission of the owner of the farm, would be trespass. The Susquehanna, and other fresh water rivers of the State in which the tide does not flow, do not belong to the owners of the bank, and no person has the exclusive right of property therein, (14 S., and R. 71); (61 Penn'a, 21.) The concessions of 1681 are confined to first purchasers, and persons claiming under them. (*Ibid.*) Independently of the acts 8th February, 1804, and 23d of February, 1809, a riparian owner has no exclusive right of fishery opposite his shore in any navigable river, (61 Penn'a, 211) He has the exclusive right only when the river is not navigable, and when not exempted by the concession of 1681. I have thus imperfectly touched upon some of the legal rights and duties of farmers, leaving many parts of my subject without a mention. Had time permitted, I should have been glad to say a word about the many impositions practiced by evil designing men upon our farmers, in the sale of seeds, improved lightning-rods, "patent pitch-forks," and the like; but we trust that in the present age of enlightenment of the world, no farmer will allow himself to get into the hands of accomplished villians for any purpose whatever; and, in conclusion, if I have been able to impart any valuable information, and save any farmer from the many entanglements of the law, I shall feel that my purpose has been fully accomplished.

The subject being open for discussion, Prof. ALLEN, of Tioga, said:

Last week, the council of the borough in which I live passed an ordinance that I should not bring into the town or put on my farm fleshings from the tannery. I have been doing it for the last ten years, and have had them taken from the carts and thrown on the land. The farm is situated within the borough of Mansfield. I said to the burgess I didn't care much about it; but if I should go on, can they do anything?

Mr. HOOD. They can bring an action of nuisance. If they notify you of the nuisance, you can remove it, and they have no remedy.

Prof. **ALLEN**. Suppose I continue to bring it.

Mr. **HOOD**. It is equally a nuisance, and they may hold you.

Prof. **ALLEN**. Then, in the same borough there is a tannery, and they make no complaint about that.

Mr. **HOOD**. They have the same right. If persons make complaint to the authorities that it is a nuisance, and the owner does not remove it, the borough authorities would have the right, and to put the expense on the property.

I examined the laws of Pennsylvania as thoroughly as I could on the subjects treated upon. I understand the gentlemen's case would come under the head of nuisance. If it was a nuisance to the people of that section of the town, if they would complain, the authorities could have it removed; if not, the authorities could be proceeded against.

Mr. E. G. **FAHNESTOCK**, of Adams. If they are complained of, is it not incumbent upon the authorities to remove tanneries out of the town?

Mr. **HOOD**. Yes, sir.

Mr. **FAHNESTOCK**. We have an ordinance prohibiting the bringing of nuisances into the town of Gettysburg; and we have an ordinance against the killing of animals within the borough limits. It was brought into court, and decided that the authorities have power.

Mr. **HOOD**. The duty of the borough authorities would be to remove the nuisance, and, if necessary, to take the tannery away. If they cannot get it away without taking the whole tannery, then the whole tannery must go.

Mr. **MOORE**, of Berks. There is one nuisance not touched upon as yet. Some farmers are troubled by their neighbors fowls coming upon their property. How are they to be protected?

Mr. **HOOD**. The only remedy would be like in the case of rabbits—to destroy them.

A Member. Do they lose ownership as soon as they are on another's property?

Mr. **HOOD**. Yes, sir; the only species of fowl that can be an estray, is the swan. If they wander away, they can be taken up, and advertised, and sold as estrays. If other kinds of fowls come upon your premises, you have to protect youself, as the case may be. If a horse, or hog, or sheep, or goat, the law requires you to take it up, and advertise it.

Mr. **SMITH**, of Luzerne. Is there any law in Pennsylvania for goats running at large?

Mr. **HOOD**. I do not know of any statute in Pennsylvania, as to that.

Mr. **MOORE**, of Berks. I was at one time advised to destroy poultry, but not to take them home and eat them; to kill them, and throw them over the fence.

Mr. T. J. **EDGE**, of Chester. Does not the law recognize poultry as personal property?

Mr. **HOOD**. I think not.

Mr. **MUSSELMAN**, of Somerset. When they steal poultry, is not the poultry personal property?

Mr. **BEEBE**, of Crawford. I infer the gentleman means they are not personal property when they go off the premises.

Mr. **ENGLE**, of Lancaster. About dogs killing sheep—how is it with dogs that are registered? Is there no law protecting them, or have they more right to kill sheep than other dogs?

Mr. **HOOD**. I think they have no more rights than other dogs. I think the statute is sweeping. "Any dog found worrying sheep, or following after sheep with hostile intent," it must be held in Pennsylvania, that the owner is authorized in shooting that dog.

Mr. **ROBINSON**, of Mercer. Dogs are not recognized as personal property unless registered. If a dog is not registered, you have no remedy if he is stolen. Registering simply gives you the right of personal property in the dog.

Mr. **BEEBE**, of Crawford. As to dogs in Pennsylvania, and their taxation, the statutes are taken from those referred to by Mr. Hood, and they are thereby made personal property. That explains the difference of opinion on that point; and whether dogs are taxed for the protection of sheep, or are registered, it makes them thereby personal property.

Mr. **HOOD**. I am informed by Mr. Thompson that in Mercer county, they have a special dog law. I was giving the general law. If a dog is taxed, he is owned.

SHOULD AGRICULTURAL TEXT-BOOKS BE INTRODUCED IN THE PUBLIC SCHOOLS?

By Dr. JAMES CALDER, *President of the Pennsylvania State College.*

The above question, whose consideration in a brief essay has been assigned me, is one whose origin I do not know; nor have I learned by whose desire it has been brought before this Board. Yet it is one in which I am interested, and whose brief consideration here may lead to desirable results. Its presentation for discussion indicates two facts: first, that agriculture is rapidly becoming a subject which is receiving, and is felt to merit, general attention; and, secondly, that there is a growing belief that our public schools can and should be made to do more of the work of practical or technical instruction.

As to the great importance of agriculture all observing and intelligent people are agreed. It is felt to be the foundation industry. It is healthful, useful, honorable, and compensating. Where it prospers under a wise government, all other industries are stimulated; and to the same extent the country is independent and its citizens happy.

Yet, after so many years of experience, there continues great ignorance concerning the principles of the science of agriculture; and comparatively few persons are confident as to the methods which most fully exemplify the art. Men who have been farmers all their lives cannot tell how plants feed or crops grow; and thousands who spread lime upon their fields suppose that in so doing they are scattering manure, and wonder how it comes to pass that sometimes they get too much of so good a thing. Few subjects need so much to be more fully studied by our best minds, and then to be clearly set before the people at large.

Experience shows us that when persons intended for any particular calling have their interest in it awakened early there is a probability that they will secure an understanding of it, and grow up with a fondness for it, and an adaptation to it, which cannot be hoped for in the case of those who, at riper years, enter upon a pursuit. Particularly is this the fact when the directing of the attention is attended by intelligent teaching, and the dexterity of the hand is accompanied by enlightenment of the mind as to the methods pursued as well as the results aimed at.

In seeking to interest persons in agriculture, it is especially needful to free their minds from error as to the farmer's life, his work, his unpleasant experiences, and his advantages. The majority of inexperienced people suppose that agriculture is a calling whose chief marks are drudgery, discomfort, ignorance, and boorishness. Text-books on the subject, properly prepared for our public schools, could do much to set forth the pleasant possibilities of the husbandman's profession; and could indicate methods to avoid common mistakes, and makes certain a satisfactory degree of success to every one who, by industry and integrity, merits it. This freeing from prejudices, and the enlightening of the mind as to the favorable characteristics of the avocation being done early in life, it is certain that many would be induced to pursue it who now refuse it any consideration.

This proposed addition to public school instruction would, doubtless, be further beneficial, in that it would serve to attract many from the overcrowded towns and cities, in all our States, to employment and homes in the country. They could then make the change with fuller knowledge as to the new duties upon which they were entering, and greater confidence as to their success in them. We might hope that our newer States, especially, would be much benefited by such an enlargement of the course of study for our youth. Such knowledge would make the cheap and fertile lands of the West doubly attractive, and locate upon them the intelligent and educated as well as those who are merely enterprising and industrious.

The acquaintance with related sciences, which to various degrees would be attained by this study, forms an additional reason why it should be introduced. Even a slight proficiency in the science of agriculture would lead to some knowledge of botany, chemistry, zoölogy, geology, and mineralogy. The taste thus given would, in many instances, lead to a fuller investigation of those branches, and result in a familiarity with nature which would do much to free the mind from superstition, and qualify it to examine higher truths.

To the proposition under discussion it is certain that various objections will be brought, some of which we may now consider. It will be held by some that "Particular instruction in any art should not be given in the public schools." They maintain that all instruction there should be of the most elementary and essential character, and that everything beyond that, particularly that which looks toward a special calling, should be sought elsewhere, and be secured without governmental direction or aid. Much complaint is made because of the advance already taken in that objectionable line; and a loud call is sounded, exhorting to a return to the usage which prevailed in the infancy of our common school system.

But this recall comes too late. The people have decided the main question, and our public schools can never be put back where they were in their beginning. As to the topic which we are considering, it may be said, further, that it is not proposed to give instruction in all the details of agriculture. That is clearly undesirable and impossible. But the science is a most important one, and deservedly awakens a general interest. Men of all other callings find some use for the knowledge which is comprehended in it, and no one would find a short course in it barren or unprofitable. To the extent that they can, would it not, indeed, be well to have our public schools give some instruction preparatory to every art, the practice of which will be a public benefit?

In addition to the reasons already suggested, it may be said that such foundation, laid in the schools, would develop tastes which otherwise might lie unknown to even the possessors of them. It would present to students a wider range of callings, and help them to make their selection. And after the selection, it would do much toward rendering their apprenticeship more pleasant, and their subsequent careers as workmen and proprietors more useful and prosperous.

It is objected, further, that "if such books were prepared, teachers could not be found who are qualified to use them profitably." But this would not be a new experience in school teaching, and the method by which the difficulty has been overcome as to other studies, could be successfully employed in this case. For instance, the introduction of the study of physiology has been of comparatively recent date, and when the branch was first required, but few teachers could give instruction in it. But with the demand came the attainment of qualification, and now that study is as fairly taught as are others, which have been in the course for a longer time. Thus would it be as to the successful use of text-books on agriculture. American achievements show us that the demand for the books would prompt competent writers to prepare them, and the call for teachers to use them would not long be without satisfactory response.

The question committed to me for presentation, meets another objection, namely: That "the course of study in the public schools is overcrowded already, and there is no time for new branches, even if there were strength to study them, or propriety in teaching them." To this, it may be replied, that the proposed books should not be introduced in every school, but only in such as are sufficiently advanced to use them profitably. It is the experience of school officers, that the improvement of our primary schools admits of the introduction into them of studies which formerly could be pursued in our higher schools only. This change has made it possible to bring into the higher departments, branches for which there once was neither time nor qualification.

It may be added, that up to a certain limit, a variety in the studies offered in a school is to be preferred to a course of great uniformity and inflexibility. Such an arrangement best meets the demands of the different tastes and talents found in all our schools, and more fully secures the purpose of the people in establishing institutions for the education of the masses. So far as may be, every child should be so helped to develop his powers as to make his contribution to the honor, prosperity, and fame of his country as great as possible.

On the negative side of this question it will be claimed further, that, "to be useful, these text-books must be supplemented with practical instruction, which, in many places, and especially in cities, would be impossible." To this, I reply, that the thought underlying the objection is undoubtedly correct. Unfortunately the objection is one which can be brought against much of the teaching in our schools and colleges. We have words, words, words, and enough of them; but through the absence of illustrations, models, and specimens, and the omission on the part of the teacher to show how to do the thing spoken of, and the failure to require the student to *do* it himself, as well as to tell how it is to be done, the study makes but little impression and is soon forgotten. All theory and no practice will not make a thorough scholar anywhere.

But a text-book for public schools should be very plainly written. Explanations of terms and processes should be ample, and, wherever possible, illustrations, both verbal and pictorial, should be given.

In the study under consideration, the books could bear many cuts of implements, methods, and products. In addition, charts and pictures could be exhibited to the class. Models, images, fruits, grains, and the vast range of things used in object teaching, could be employed; and the study, though, in some unfavored locality, almost confined to the school room, would be found not only useful, but highly attractive and entertaining. Scholars living in the country would get that part of the instruction which more fully deserves to be called practical on their home grounds, or the farms to their neighbors. For schools in towns and cities, occasional excursions to the country, for investigation and further study, would be valuable in more ways than one.

In conclusion, I repeat that the inquiry assigned as the subject of this essay is not an idle one; and, that under circumstances which can be secured in very many of our higher public schools, the question should be answered in the affirmative.

The question being open for discussion, Prof. J. P. **Wickersham**, Superintendent of Public Instruction, said: While I am a great deal of a radical, I am somewhat of a conservative. I am not in favor of converting all our schools into agricultural schools, by no means. But I do think there is a place in all our public schools and normal schools for the introduction of subjects bearing upon agriculture. It will probably be a long time before in our cities and villages that a text-book on agriculture will be used; but I think the time is here now when in the rural districts among farmers a book of that kind might be placed. I believe the work in our schools, as it is done at present, would not be marred in the least, but rather improved, by an additional work in this direction, embracing, as it would, elements in the natural sciences. But it is not a new thing at all. Our neighbors up in Canada have a little manual that they use on the subject of agriculture. It is a little text-book. I do not take it, we are going to introduce a whole series of four or five books on agriculture. That is impracticable. We are not to have another series, like our arithmetics and geographies. Too many series, and the people complain. I do not propose to do anything of that kind, but a simple manual embracing the principles of agriculture, to cost not more than twenty-five cents when introduced and placed in our public schools. They have such a manual in the public schools, both in Quebec and Ontario. I think it is in the national schools of good old Ireland they were taught the elements of agriculture in them, and I was told they carried the information they gained in the schools on to the farm, and they were doing an immense amount of good. I have at home, in French, a manual on this same subject. To be practical is it not entirely feasible to have a little book, say with a chapter on minerals, in which shall enter limestone, quartz, sandstone, and something of slate and shale, and a few of the leading minerals that we find on our farms? and could we not induce them to bring little specimens on that account until they have a little cabinet? There could be a chapter on forest trees—the beech, the maple, and the oak. Why some of our farmers can hardly go through our forests and name the trees; and yet a little child could learn to select the different kinds in a short time, not by the committing to memory of hard, botanical names, but the common terms. What a delightful chapter there might be on the orchard and the fruits; and at the proper season could not the little children bring examples of the different kinds of fruits? And might not the teacher instil into them a love for fruit-growing, setting forth the advantages of the different kinds? And what information might go out from every teacher to the farm on the subject? Might there not be a delightful chapter on the flower-garden and the lawn? because one of the things that our farmers most need is ornamentation, and one of the things to keep your children home is to make home pleasant. A desire could be caused to grow for neat lawns, and the children could be taught how they should be cared for. Then you could teach them the names of the grains and the grasses. I can imagine a very little book, of a hundred pages, that would not cost, may be, twenty-five cents—not a tenth part scarcely of what one of our geographies would cost—a book not only adapted to a child of six years but ten years; which would create an interest; would give information of a general kind, and would be worth more than a great deal they now study. That is my idea; not a series of agricultural text-books, but a little book which would introduce the rudiments into the schools. Farmers should pay their portion of the taxes toward supporting the schools, but they should also have their money back with a good percentage. The farmers ought to demand this, it seems to me. We might cut out a part of one of the geographies, or one of the series, and with this in its place do more real good.

Mr. BROWN, of Mercer. Are there any legal barriers in the way?

Prof. WICKERSHAM. The law names certain branches that have to be taught in the schools—reading, arithmetic, writing, &c. But any school board of Mercer county, or any county in Pennsylvania, that would resolve to have branches taught in the schools, would have the right to require it to be done. But I know of no little manual exactly suitable for our schools covering this ground. It would be necessary for some one thoroughly acquainted with agriculture, and acquainted with schools and children, to prepare such a book. We have a number of books, but not any adapted as text-books for our public schools. Therefore, it would be necessary to have prepared such a little book as I have in mind. Of course we expect to have our teachers better prepared at our normal schools, and then it will not matter whether we have any books or not.

F. A. ALLEN, of Tioga. To meet the question of time, and that there are already too many branches of study; and that the scholars are already crammed, is it not of more importance to read and study this, than to know what town is situated on the northeast branch of the Congo river, or to study words, words, words? For it is so. In some branches, this is a constant study, even if you take up the definition of words. For instance, Johnson gives this definition of "net-work:" "Anything reticular or decussated, with interstices between the intersections." Then take one of the arithmetical rules for changing a compound fraction into a simple one: You "multiply the numerator of the numerator by the denominator of the denominator for a new numerator; and the denominator of the numerator by the numerator of the denominator for a new denominator." Words, words, words; and the boy is drilled in them, and the best portion of his time is taken up with these forms of study. If he continues until he comes to the latter part of what is called "practical arithmetic," he is compelled to study out how, if a horse is bought, and the purchaser pays two cents for the first nail, four cents for the next nail, and so on, how much did the horse cost? And this style of "educating" has gone on until books can be sold by the pound. I am glad that our president touched upon this question of material, much of it so worthless and stultifying that many hate the common school because of the study of this useless trash. It has been words, words, words, until the wisdom of our day has become confounded. It is time that these things were weeded out, and the books made simpler. If our boys' thoughts are turned to the subject of agriculture, as they should be, they will follow it, and not go elsewhere, when they can lead a farmers' life.

Let me illustrate. The moment farmers begin to look upon the question, that it will not do to put their boys upon the farm merely to assist in building fences, or simply to help until the last load of grain is in; but that the boys must have some knowledge, and a chance to examine, and opportunities to invent things, the moment they do this, there will be a change for the better. Half a dozen of the inventions used on our school property the boys have discovered. I have a system of boxes for weighing potatoes; just a bushel in a box, simply because we have encouraged the matter of invention and ingenuity. The moment we allow this matter to enter our schools, we can see at once what it leads to. So far as our own schools are concerned, we will have this text book in the normal school located in Tioga county.

OUR TOBACCO CROP FOR 1879.

By FRANK R. DIFFENDERFFER, *Lancaster.*

That there exists a good deal of prejudice, on the part of some persons, against the culture of tobacco, is simply undeniable. Many farmers still refuse to grow it, while others, although by no means partial to it, have nevertheless been induced, by the liberal profits it returns, to go into its cultivation. Indeed, so general has the tobacco crop become within the borders of certain counties, that few farms are to be seen during the summer without a tobacco field of greater or less extent. Such, in fact, has become the extent and value of the crop in Pennsylvania, that it is rapidly pushing itself into the front rank of our agricultural productions, and as such, deserving of more consideration than it has hitherto received in the annual reports of our State Agricultural Society.

Climatology of Tobacco.

Before entering upon the more immediate discussion of the main subject of this article, a few words upon the climatology of this product will not be amiss. In general terms, we may say that tobacco can be grown successfully wherever Indian corn will mature. As a rule, wherever the mean temperature during the month of July is as much as sixty-eight degrees Fahrenheit, tobacco can be grown. From this, it will be seen that among the northern States, nearly, if not all New England, central New York, Ohio, southern Michigan, Indiana, Illinois, and parts of Iowa and Wisconsin, are adapted to its cultivation, perhaps quite as well as Kentucky and Virginia, unless in seasons of unusually early frosts. But even this disadvantage can be overcome by a careful selection of the proper varieties, and acclimatization. Southward, of course, there is no limit, as it is able to bear any degree of heat or humidity the tropics have to offer. Were it not for our more variable climate, there exists no known reason why brands as choice as any grown in Cuba might not be grown in Pennsylvania. The readiness with which Cuban varieties adapt themselves to our more northern climate, is another evidence of the remarkable degree of adaptability possessed by this plant. Temperature is the great regulator, and we may set it down as a pretty safe rule, that wherever frosts do not occur between the middle of May and the middle of September, say a period of one hundred and twenty days, tobacco growing can be successfully carried on.

Its Culture in Pennsylvania.

The area of tobacco cultivation is gradually extending to portions of the State where its culture was unknown hitherto. Lycoming and Clinton counties now boast of a very fair acreage, and some of the fields compare very favorably with those of Lancaster and York. We lately examined a fine lot of leaves from Westmoreland county, where the cultivation of the plant is of recent introduction. Indeed, all the central counties of the State are engaged in tobacco growing to some extent. We have not the exact statistics at hand, but doubt whether any, except the most northern tier of counties, are now without more or less tobacco farming. We have numerous reports from many quarters, and the accounts are, without exception, favorable.

Of course, the older growing districts maintain the lead. Lancaster and York counties continue to be the large producing districts, the former alone producing two thirds of the entire crop of the State. Of course, soil, as well as climate, has much to do with the success that will attend the grower. The above named counties, and those lying contiguous to them, seem especially adapted to tobacco growing. The conditions of soil and climate seem there to be most successfully present. How far these same conditions are to be met elsewhere, is not yet certainly known, but there are no good reasons for supposing that elsewhere they may not also be found quite as fully united. If such should prove to be the case, there may come a time when its culture and after handling may be as well understood in such places as it now is in Lancaster county, and when the article they grow will sell as well as the product of the older tobacco growing sections. Whether this increased growth should be encouraged is a subject with which we do not care to meddle. It is a question which planters must decide for themselves. Besides, no amount of unfavorable criticism is likely to put down a crop which has proved so profitable, and for which the demand is yearly increasing. It has proved a mine of wealth to certain sections, and may be left to take care of itself.

The Increase in Production.

What has been done in the past, may not correctly measure the future of tobacco growing in this State, but the facts are nevertheless both interesting and suggestive. The first recorded estimate of our yearly product is in the circular of J. S. Gans, a tobacco broker of New York city, for the year 1851. In that report, the crop of seed leaf in Connecticut, Ohio, and Pennsylvania for 1849, is set down at six thousand cases, one third of which was exported; the rest was taken by speculators who bought it at fourteen and sixteen cents and got eighteen and twenty-two, although some was sold as high as twenty-six and thirty. In 1850, the largest crop raised up to that time was grown. Pennsylvania grew thirty-five hundred cases out of a total of thirteen thousand five hundred produced by Connecticut, Pennsylvania, New York, and Ohio, the first named being credited with five thousand cases. Only twelve and fourteen cents were realized for the best wrappers, the lower grades selling at proportionate prices. About one half of the above was required for home consumption, and as the exports at that time were only about three hundred cases, there was a large surplus for which there seemed to be no market.

Our Present Production.

How stands the case to-day? The most reliable data obtainable, and we are certain they are as correct as such statistics can be made, give a total for the northern seed leaf growing States of one hundred and fifty-six thousand cases, of which this State contributed forty-five thousand cases, being the leading one among them all. Connecticut has fallen behind us in the race, while Ohio, Illinois, and Wisconsin have become rivals to some extent so far as quantity is concerned; in quality we lead them all.

It is, of course, too soon to be able to form a correct estimate of the crop of the present year. That can only be done when the crop has been bought up and put into cases. Enough, however, is known to satisfy us that the crop of Pennsylvania for 1879, will at least reach sixty thousand cases, and may possibly exceed that sum one sixth or even more.

The Season of 1879.

In our quarterly report for July, we announced a most gratifying improvement in the condition of the tobacco crop, compared with the previous months. Up to that time the prospects were very disheartening, and the growers began to fear their labors would meet with a very poor recompense, indeed. During the early part of the season, a number of causes combined to make the outlook anything but promising. The spring opened late, there were cool nights far into the spring, and a frost nipped not only many plants already set out in the fields, but in many cases destroyed those still remaining in the seed beds. Lastly came the drought, the long continuance of which at one time threatened an almost total ruin of the crop in the largest tobacco growing districts.

Various other Drawbacks.

The drought, however, was the most serious drawback the crop had to contend with. Nearly all but the earliest planted was put out under unfavorable circumstances. The ground was dry and the sun hot, and no rain falling, planters, in many places, were from the beginning put to the necessity of watering the drooping plants. Where the acreage was large, this was a task at once tedious and expensive. Besides, this artificial watering is far from being as satisfactory in its results, as when the required moisture is supplied by natural means. This fact is as applicable to all other crops as to tobacco. A long and intimate acquaintance with the methods of irrigation, as practiced in some of our western territories, has fully satisfied the writer that even where there is no lack of water for irrigating purposes, crops of all kinds are nearly doubled during a rainy season, when little or no artificial watering is required.

The cut-worms also made their appearance in the tobacco fields in unusual numbers. In some places the havoc they committed was unusually great. Farmers, in many instances, were required to replant two and three times. A case came to our notice, where, through the combined influences of the drought and cut-worms, out of more than fifty thousand plants set out, the grower lost all but five thousand, and was, with much difficulty, able to procure enough to replace the lost ones.

The Welcome Rain Comes at Last.

The dry spell reached its worst stage near the close of July. There were a few showers in Lancaster and the adjoining counties on the 9th and 10th of that month, and again on the 11th, the latter only being of any material benefit. But it brought in its train a tremendous hail storm, which did immense damage in certain portions of Lancaster, York, Berks, and other counties. Such tobacco as was already large in the leaf was badly riddled by hail, and many fields were converted from wrappers into fillers in a few minutes. The rain that accompanied the storm was very heavy for a short time, washing out the plants in fields that were hilly, and covering up those on level ground with a coating of dirt, which in many cases killed them outright, and in many more so retarded their growth that they never entirely recovered from the effects of the disaster. Although the rainfall was considerable, a week later the ground seemed dry as before. The fields began to look still worse. The plants assumed a sickly color; the leaves were apparently scorched, and began, in some places, to present a withered appearance. The early planted was growing prematurely ripe long before the usual development of leaf was attained. Topping began about July 15, in the most advanced fields, and was, as a rule, lower than usual.

On July 26, the long continued dry weather came to an end. On that day, rain began to fall all over the State, almost everywhere in abundance, and in some places in excessive quantities. Low lying fields—and such are generally selected for tobacco ground—were flooded, and many plants ruined; but this was amply compensated for by the general benefit that resulted not only to this crop, but to corn and potatoes as well. The effect everywhere was almost marvelous. The dwarfed and stunted plants took a new start, and a single week was sufficient to show a very remarkable improvement. The early planted was, of course, too far advanced to derive full benefit from the timely rain, but even on it the results were decided and marked. Its best effects were seen on that which was planted later. This was at that stage of growth when rain tells most quickly and effectually, and we have never seen a more decided change for the better than was shown in this crop. It literally "spread" itself, and the fact was again verified that few crops recover so quickly, under favorable circumstances, from the various drawbacks that from time to time come upon them. The late planted was also benefited greatly, and bid fair to make a very fair crop, should frost not make its appearance too soon.

Previous to this heavy rain, the prospects of a good crop were very poor, indeed. No one believed three fourths of an average crop would be made, while others set it down at one half, or less. But the growers took heart again, and fields that had been neglected were again carefully looked after; and the result has amply rewarded their labors. Even then it was not believed, as we stated in our July report, that there would be an average crop, but those fears happily proved to have been unfounded.

Irregularity of the Crop.

No tobacco crop ever grown in the central portion of the State was so irregular as the one of 1879. Not only did fields that lay side by side afford the greatest contrast, but the plants in the same field showed every degree of growth, from those hardly larger than a man's hand, to the giant stalks with leaves measuring from three to four feet in length. Many farmers, however, say they have never had a crop that showed to such excellent advantage when cutting time came, as the present one. A succession of mild, warm showers followed during the remainder of the season, culminating in the general rain that fell in all parts of the State on the 16th and 17th of August. These brought along the plants rapidly.

Owing to the great difference in the time of planting, and the irregularity of the stand, the crop, as a matter of course, did not mature with the usual regularity. Up to August 20, a comparatively small portion of the crop had been cut, although a great deal was housed between that time and the 1st of September. The cutting season was perhaps the longest ever known, the last plants not being in the barns before October 1. But before this consummation was reached, more misfortunes had come upon the crop in parts of Lancaster and York counties. On August 23 a heavy storm of rain and hail visited portions of these counties, and did much damage. Although it did not cover a wide district, it proved very hurtful in the places embraced in its track. Some growers suffered severely, the losses to individual farmers running all the way from $100 to $3,000. Favorable weather followed, and the crop was put away rapidly, until the 31st of August, when another hail storm, and the worst of the season, came upon certain portions of Lancaster county. Luckily, many growers had all, or at least a portion of their crops housed, but still the loss was very great, some losing as many as twelve acres, and running from that amount down to the smallest patches. Fortunately, too, the hail in some places was not large, penetrating only the upper leaves, and leaving the lower ones unharmed. Still some was rendered utterly valueless, and was either hauled on the manure pile, or turned under with the plow. The loss was estimated all the way from $30,000 to $50,000. The remainder of the season was comparatively favorable, and the plants were put away in good condition.

Pole Sweat Developed.

In consequence of the frequent rains and the rapid growth of the plants, the latter were unusually sappy. There was also an extraordinary development of leaf, from the same causes. The acreage was also greater than ever before, and many farmers discovered their barns were unequal to the task of housing their product. This latter fact compelled many to hang their plants too closely in their sheds and barns, where the unusual size of the plants, and their very watery condition, induced pole sweat. A good deal of tobacco was injured from this cause. Many farmers were obliged to take it down, and put it up again in a less crowded condition. Others, whose sheds were tightly constructed, placed stoves in them, and thus, by artificial means, dried out the "fatty" stems rapidly, and saved their crops. Fortunately, the weather during the greater portion of October was unusually warm, and this, too, was of great value in putting an end to what threatened at one time to prove a most serious matter.

Since that time the curing process has gone on rapidly and favorably. The color is reported on all sides as being everything that could be desired, giving those rich brown shades at present so much in request by manufacturers.

Probable Value of the Crop.

What will be the probable money value of the crop when it is thrown upon the market is, of course, a matter of conjecture. Its actual quality when it is taken down and stripped, will have much to do with the matter of price, but the condition of the market will be still more potent in fixing the rates. The few damp days, in the latter part of October, were sufficient to allow some of it to be taken down. We examined a few lots, and they showed to much advantage. The leaves were long, while the tobacco was tough, soft, pliable, and with that silkiness so desirable for the manufacture of fine cigars.

But few sales, comparatively, have thus far been made. Earlier in the season, soon after it was seen that the timely rains would develop the plants into an excellent crop, it was announced that the product of Duck island, in the Delaware river, about three hundred and fifty cases, were sold while still in the field, at prices variously quoted at from fifteen to twenty cents. A few sales have been made in Lancaster county at fifteen cents "through," that is, for the highest and lowest grades taken together. That is a fair average, rather more than the entire crop of last year was sold for. Some growers, however, have refused that price, and twenty and twenty-five cents are asked by those having choice lots.

As there is more good wrappery tobacco in the present crop than there was in last year's, we may reasonably conclude, that a uniform price of fourteen cents will not be too high an average. If we further estimate the total crop of the State at 66,000 cases, of 400 pounds each, we have 26,400,000 pounds. This would give us $3,696,000 as the value of the present crop in the hands of the growers; but as we deem it far more probable that the crop will exceed the figure we have set it down at, than fall below it, we believe we are not far from wrong in fixing its value at $4,000,000 in first hands. If we compare the 66,000 cases of 1879, worth nearly or quite $4,000,000, with the 3,500 cases, worth $200,000, of 1850, we may form an idea of the vast increase of this crop within our State limits and the very large sums of money it has distributed among our agricultural population. The tobacco crop can no longer be regarded as an incidental one among our farmers. In Lancaster and York counties it has taken its place among the products of the farm almost as generally as oats and corn themselves. It has poured vast wealth into some districts, and many farmers can to-day attribute their ownership of broad acres to tobacco culture. As one of our staple crops it can therefore be no longer ignored, but must be allowed to take its place as one of our most valuable productions. Some of us may regard it as a crop not to be grown, because we believe our lands can be put to better uses, but there are few who now look upon it in that light, and men of every race and creed are now engaged in its production.

Tobacco a Precarious Crop.

The experience of the present season has once more demonstrated that tobacco, while generally a very profitable crop, is at the same time one of the most precarious that the farmer can grow. None other requires such long, careful, and unremitting attention, and none is liable to failure from so many various and unavoidable causes. But we cannot see that, taking one season with another, the final results have not been fully as satisfactory as those realized from potatoes, corn, or wheat. In fact, we believe they have been more uniformly successful. During the past ten years, we believe there has been no season when the prices realized have not rewarded the husbandman. Accustomed to realizing very large profits, they have been prone to complain when the gains have not been greater than those derived per acre from the usual crops. Taking the average realized per acre during the past twenty years, there can be little doubt but that it has been twice as great as from any other crop Pennsylvania is accustomed to grow.

The Average for 1879.

The acreage prepared for planting was never so great as last spring, but the unfavorable weather at planting time, along with a scarcity of plants when they were most needed, reduced the area set out very materially, although there is hardly a doubt it exceeds that of last year considerably.

Not enough has yet been stripped at this writing, (November 1,) to show how the plants will yield. We have been told of an individual case, where the product was hardly more than half the average yield, but we are satisfied this is a mistake. The plants, as a whole, were considerably larger than the average. Some of the early planted, it is true, was topped low because of the dry spell, but the smaller number of leaves on that portion of the crop was more than made up by the superior growth of the later.

If we take the figures already given as the probable yield, namely, 26,400,000 pounds, and conceding an average of 1,400 pounds per acre, we get as a result, 18,857 acres as the area set out in tobacco in 1879. The actual figures will most likely be found between 18,000 and 20,000 acres. Taking the probable prices at which the crop will be sold as already given at $3,696,000, we get in round numbers an average of $196 per acre. How much of that sum is profit, of course varies with the individual grower. But making every possible allowance for labor, extra fertilizers, and incidental expenses, there will still be enough left to swell the farmer's bank account handsomely.

Artificial and other Fertilizers.

Those who have a prejudice against the use of artificial fertilizers, pretend that fields wherever it was used last spring, did not stand the drought as well as those on which ordinary barn-yard manure was used. How correct their theory is, we have no means of verifying, but some of our most intelligent planters assert it as a fact susceptible of proof. As tobacco buyers discourage the use of these artificial stimulants on tobacco ground, stable manure will no doubt continue to be the main reliance of our tobacco growers. That the tobacco plant is a voracious feeder is well known, and the remainder of the farm too often suffers, because of the large demands made on the manure pile by the tobacco field. Unless the ground has recently been cleared of timber, it is absolutely essential that it be heavily manured if a first-class crop is desired. This manure, however, is not entirely absorbed by the tobacco crop. Often two crops of tobacco follow each other, but more generally wheat is sown where tobacco was planted the previous year. Wheat so planted, is generally excellent, often the best on the farm. From this it will be seen that really two crops are raised from a single manuring of the ground, and even then the soil is left in good condition.

Does Tobacco Impoverish the Soil.

Just here we may add a word concerning the charge which is so often heard, that tobacco is gradually impoverishing the soil of Lancaster and other counties where it has been grown for many years. If our farmers cropped their acres, year after year, as the Virginians do, without putting on fertilizers to revive their fertility, in time they too would become sterile and unproductive. There can be but one end to such farming. But our Pennsylvania farmers know better than that. They do not farm on that plan. They learned their trade in a widely different school. They long since discovered that the farmer who is forever cropping his acres without renovating them, will soon have neither crops nor lands. They make no unreasonable demands on their acres. So far, at least, our farmers have held their own; their farms have not deteriorated; their productiveness is not impaired; many have grown rich by tobacco culture, and the rich ones richer still. The average acreage put out by each farmer is generally small, and they understand the character of the soil too well to let it run down through tobacco planting. If, after a long series of years, it is found that the culture of tobacco is rendering their lands less productive, they will either quit growing it or else buy more artificial manures to maintain its present high state of fertility.

The Several Varieties Cultivated.

Nearly all the varieties of the tobacco plant known to the trade have been, from time to time, tried by our growers. For a time, considerable attention was given to the tropical sorts. The superior price which the production of Cuba commands, early engaged their attention. The famous Orinoco tobacco was also tried, but the results, at that time, were not such as to warrant a continuance of the experiments. While the aroma was superior to our northern sorts, the leaves were smaller, and the yield per acre not nearly as great, consequently the prices realized per acre were much less, although it commanded fair figures. Latterly, however, Havana tobacco has been largely planted in the New England States, and last year it was the first bought up by dealers. There is every reason to believe that after several years acclimatization it will rival our native tobacco, so far as size goes, although it may lose some of its distinctive features. We saw Havana tobacco growing in Lancaster county during the past season, the leaves of which measured forty by eighteen inches. We think it likely that this variety may again be grown in this State, before long. Wisconsin has gone into its culture extensively, and her crop finds a ready sale among manufacturers.

Handling the Crop.

The art of realizing large profits out of the tobacco field does not consist, as many seem to think, in the production of large leaves alone. That is only half the battle; the other half consists in the after handling. Nor are large leaves always desirable. Too often great size is accompanied by heavy veins or ribs that lessen its value for cigar manufacture. Large sized leaves may also, through unfavorable weather, become thick and leathery, instead of thin and silky. The short broad leaf of the Havana variety may be more valuable than its overgrown brother, grown from native plants. These objectionable features must be guarded against in every possible way.

Upon the handling of the plant after it has become ripe, its future value must depend. Here the largest experience and the soundest judgment must be called into requisition. When to cut; how long to leave it on the field; how to hang it; and how to regulate the light and ventilation after it is in the barn, are all important factors, and just in proportion as the grower understands these several questions will be the quality of the product he throws on the market. It is possible to injure the finest grown crop in the handling, while it is equally possible to materially improve an ordinary crop by careful manipulation. Experience is the great teacher in this matter. Where tobacco has been grown longest, these important matters are best understood. It is the commonest of occurrences to read accounts in newspapers published in new tobacco districts that the fields look magnificently, and the plants are equal to any to be seen in the older tobacco growing counties. Whatever the appearance on the field, it is always found that the prices realized fall below those obtained by the old growers elsewhere. It is possible that tobacco may be grown elsewhere in the State fully as good as that raised in Lancaster county, but in the end it is found the latter always commands a superior price. This is due to the more intelligent care the growers of the latter county bring to the work.

Tobacco Barns.

No one would expect a highly finished piece of work from an artisan, if the latter was not provided with the tools necessary for its production. This argument applies with equal force to the production of good tobacco. The tobacco barn is a most important factor in the preparation of a superior article. It is the farmer's main reliance for bringing out the latent qualities of the plant, and on which its market value so largely depends. This fact is so well known in the older districts that the greatest care is now given to their construction. The day has gone by when the house garret, the open wagon-shed, and even the hennery, are devoted to housing the tobacco crop. Instead of these, large, convenient, and costly buildings are now erected for this purpose. Their necessity for the production of first-class tobacco is fully recognized. The consequence has been that in the older tobacco districts most growers are now provided with these structures, and the rest are looking forward to the time when they, too, will have them, well knowing that their cost will be amply repaid by the superior facilities they afford for producing good merchantable tobacco.

Believing that we can do tobacco growers no greater service than in setting before them such a structure as will meet their wants, we have had the ground plan, together with the front and side elevations of a tobacco barn, drawn and engraved to go with this article, and shall accompany them with a description sufficiently minute to enable any intelligent carpenter to erect one suited to any tobacco grower's requirements.

These plans were taken from a barn erected during the fall by J. W. Johnson, Esq., on his farm in Drumore township, Lancaster county. They represent a first class modern tobacco barn, both in plan and construction. In a single particular it differs from all we have seen, and that is its superior width of forty feet, the usual width being thirty-six feet in the largest sized barns. When adequate provisions have been made for ventilation, as has been done in the present case, we do not see that the additional four feet are objectionable, while in some particulars they are very desirable.

The Cellar.

A cellar is indispensable in a tobacco barn. It permits the removal of tobacco from the laths when in stripping condition, and its remaining in that condition for an indefinite period until the grower has time to prepare it for market. It affords a warm, pleasant place for the workmen to labor in, and a capital place in which to store the tobacco until sold. It is simply impossible to manipulate the weed on an ordinary barn floor or open shed with anything like the success such a cellar affords.

As will be seen, the cellar in the ground plan extends beneath the entire barn, the latter running east and west, the entrance being at the latter end. It has a uniform depth of seven and a half feet. The walls are of stone, twenty inches thick, are plastered, white-washed, and rise high enough out of the ground to allow of windows for light and ventilation. Eight brick pillars, 18×18 inches, placed at proper intervals, support two girders, 8×11 inches, running lengthwise. The cellar is divided into two compartments by a wooden partition running clear across the western front, making a stripping-room 12×40 feet, while the larger room is 68×40 feet, and will be used for hanging the tobacco brought down from above, either to facilitate or hasten the operation of dampening, preparatory to its being taken into the stripping-room. The latter has two windows facing the south and another the west, besides a door near the northwest corner. The stripping-room is provided with a stove for the greater comfort of the workmen. In the main cellar room there are three windows on the south side, with corresponding iron gratings on the north side, for ventilating purposes.

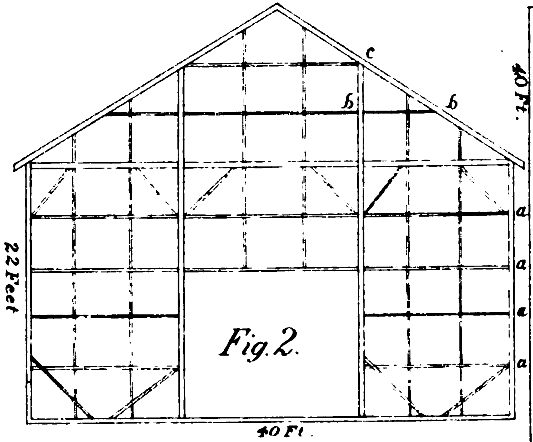
The Building Itself.

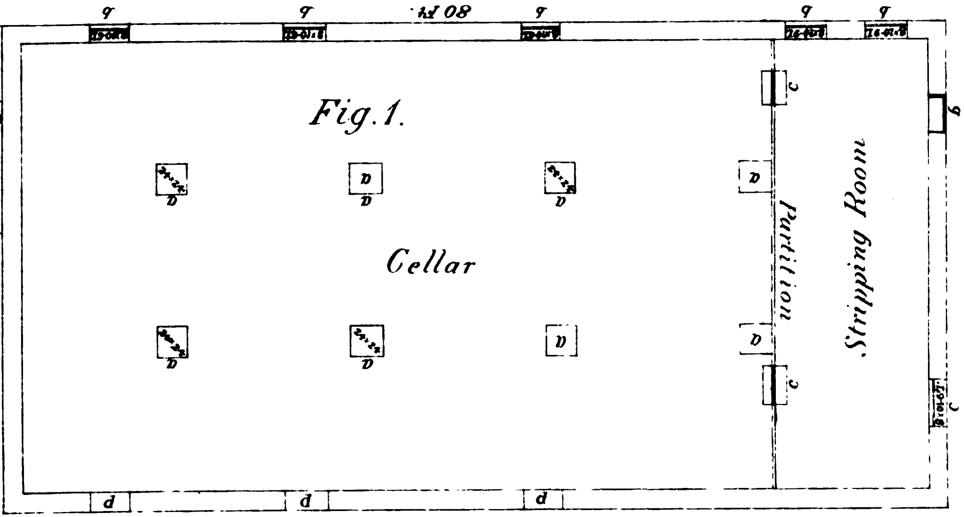
The superstructure is frame. Sills 8×8 inches rest on the walls. Joists of the necessary strength run from the girders to the sills. The floor is a close one, with traps leading into the cellar, and through which the tobacco is lowered. The posts are 7×8 inches, and are six in number on each side, two more rows running through the middle and resting on the girders. The barn is thus divided into three sections, as it were, lengthwise, those on either side being fourteen feet wide, while the central one, to be used for a driving-way, is twelve feet wide. At the eastern end teams can enter on a level, and they make their exit at the west end over a common earthen bridge. The height from the floor to the square is twenty-two feet. This allows ample room for the hanging of five tiers of plants between the square and floor. The distance between the posts longitudinally is sixteen feet, forming five sections of that width across the barn, each one being 16×40 feet, or equal to a small barn in itself when the height is considered. As will also be seen, these posts are firmly braced, and heavy ties run both lengthwise and across the building, binding all strongly together. The rafter plates are 5×7 inches, and the purlines 6×7. The building is covered with ordinary lap weather-boarding. Ventilation is provided by the usual horizontal openings, operated by perpendicular levers. (We may say here, by way of parenthesis, that perpendicular openings for ventilating purposes are a delusion, pure and simple, without any scientific basis whatever.) These openings are each one foot high, running the length of the barn. There is one to every tier of tobacco, making five in all, each one operating independently of all the rest. No ventilators for the escape of air at the comb of the roof is provided, which we regard as an important omission considering the unusual width of the building.

Material and Cost.

The lumber in the building throughout is hemlock. Pine would have cost about seventy-five dollars more, and would, perhaps, be fully as cheap at the additional cost. The stone and sand for the cellar wall are from the farm itself, and were hauled by Mr. Johnson's own teams, as was also the lime and lumber, the latter having been brought from the nearest railroad station, three miles distant. The hauling having been nearly all done by the owner himself, of course lessened the cost materially. The completed structure, after having been painted and spouted, cost about $1,100. In places where lumber can be had nearer home, the cost would, of course, be materially lessened. From seven to eight acres of average quality tobacco can be hung up in the barn at one time, due regard being had to its careful stowage. Should it at any time become desirable to convert this building into an ordinary barn, the change could be made at little expense. This end was had in view when the barn was put up. With such a structure, the tobacco grower can count confidently on being able to manipulate his crop to the best advantage, and with the hope of satisfactory results.

Some of our more advanced growers have, within a year or two, departed from the usual method of splitting the plants on laths, as they believe the leaves nearest the split are injured thereby; instead, they hang the plants on small wire hooks, which allows the stem to dry out evenly and saves a vast amount of labor besides. We believe this custom will gain new adherents every year. Other wide-awake planters, who use small engines for





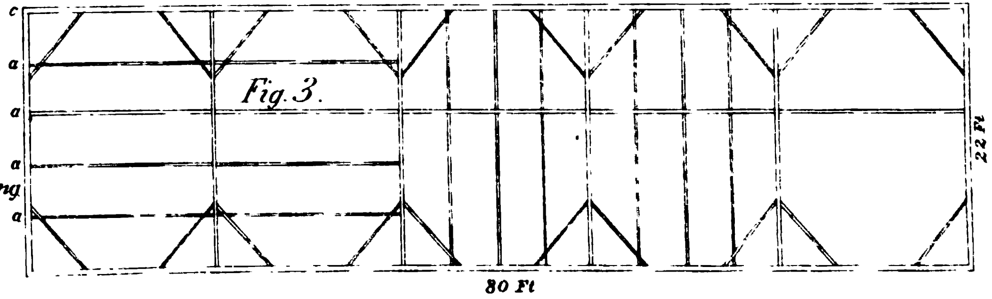


Fig. 1. Cellar a.a. Brick Pillars; b.b Windows; c. Doors, d.d Ventilators.

Fig. 2 Front Elevation a.a 4×6. Carriers, b. 3×4 and 1½×4 Rails; c. 3×5. Rails.

Fig. 3. Side Elevation a.a. 3×5. Rails; b 3×8. Raising Pieces and Rails, c. 5×7 Plates and 5×7 Cross Pieces.

steaming food for stock, and other purposes on the farm, have introduced a system of pipes, by means of which artificial heat can be brought to bear on the plants, should they develop symptoms of pole-sweat, as was the case this year, as we have already stated.

Tobacco Warehouses.

The necessity for convenient tobacco barns is hardly greater than that for well arranged and commodious tobacco warehouses. The crop must be packed at places near the point of its production, to keep down the cost as well as to give the best results. In fact, they are absolutely necessary to a convenient handling of the crop. The result has been, that in some of the great producing districts, notably Lancaster county, warehouses in large numbers have been erected in which the crop is delivered and packed. These buildings are, in some instances, large enough to store as many as five thousand cases, and supplied with every convenience experience and the necessities of the trade can suggest. Lancaster being the central mart of the business of seed-leaf packing, has many of these large and imposing structures, although they have been put up elsewhere throughout the county during the present year.

How it has Developed a Kindred Industry.

As was to have been expected, the cultivation of tobacco on such a large scale has developed the cigar manufacturing industry to an unusual degree. We have not the statistics of the entire State on this point at our command, and can therefore speak only of the importance of this traffic in the ninth internal revenue district, embracing the counties of Lancaster, York, Cumberland, and Perry. There are about one thousand one hundred and forty-eight cigar manufacturing establishments within its limits. The number of bonded hands in Lancaster county alone, is one thousand eight hundred, of which about three hundred are females. As many as $86,000 worth of cigar stamps were used in last September, which is equivalent to a sale of fifteen million cigars. The total amount of revenue collected from the cigar industry of this district for the fiscal year ending June 30, 1879, was $700,866, indicating a production of cigars amounting to one hundred and sixteen million eight hundred and eleven thousand. Taking the Government allowance of twenty-five pounds of tobacco for every thousand cigars, we get a consumption of seven thousand two hundred and fifty cases in this single district, or nearly one fifteenth of the entire amount of seedleaf consumed in the United States last year. These are astounding figures to the uninitiated, and as the increase from year to year is very decided, we have every reason to believe the cigar industry in this State will reach even a far greater development during the next decade. Of course, this is the direct outgrowth of the rapid increase in our tobacco crop. Together they have proved a veritable mine of wealth to Pennsylvania.

Sales of the Crop.

December 10.—An unexpected delay in issuing this volume enables me to bring the history of the crop down to the present date. The promise of developing into an excellent quality of tobacco, indicated in the earlier portion of this article, has been fully sustained. The color is unexceptionable, and there is very little development of white veins. In consequence of the large amount of 1878 tobacco still in the market, little or no movement was looked for in the present crop, until the beginning of next year, but these speculations have, fortunately, proved unfounded.

About the 10th of November, a few agents came into the tobacco growing districts, and, at once, began operations. To the surprise of many, they began offering very fair prices, and, although very little of the tobacco was stripped, they began buying it while still on the poles. These pioneer buyers were speedily re-inforced by others, and, for several weeks past, as many as thirty and, perhaps, more buyers have been scouring Lancaster and the adjacent counties, hunting up choice goods, and paying full rates for them. I think I am justified in saying that in no former year has there been greater rivalry and activity in our market. The buyers seemed more anxious to purchase than the growers to sell. More tobacco was sold while still hanging on the poles than ever before. Even now, hardly one half of the crop has been taken down, and a still less quantity has been stripped.

The prices obtained, as may be inferred by the anxiety of buyers, has been greater than the best informed were led to anticipate. I have obtained hundreds of quotations from all parts of Lancaster county, and the rates have been uniformly good. Fillers have ruled from three to six cents, seconds from five to ten cents, and wrappers from fourteen to thirty cents. A very fair average may be put down at five, ten, and twenty cents, respectively, for the three kinds just mentioned. Some growers, however, have done much better. Many sales, at from seventeen to twenty-five cents per pound "through," or the three sorts lumped together, have been made. The highest I know of was twenty-six cents through—a very high price, and one that must have proved very remunerative to the grower. One farmer of my acquaintance put out eight acres, which gave him an average of eighteen hundred pounds to the acre; this he sold at twenty-three cents "through," yielding him the handsome sum of $414 per acre, or $3,312 for his entire crop. If the grower, just mentioned as having sold his crop at twenty-six cents, was as fortunate in his yield per acre, he will realize $468 per acre. Should the entire crop be lifted at the prices that have prevailed so far this season, the figures I gave in the earlier portion of this report will be fully sustained, and even exceeded. I think it more than likely, however, that the market will not be sustained at the prevailing rates: with such a very heavy crop it seems almost impossible. So far as I can ascertain, fully twelve thousand cases have been bought. Our tobacco growers have had many tribulations during the past ten months; but, at the present time, they are reaping an ample reward for all their troubles and labors.

THE STATE BOARD OF AGRICULTURE.

By Dr. W. S. ROLAND, *Member from York.*

In the consideration of the subject assigned to me I shall be brief, as I do not propose to write out a history of the State Board of Agriculture, for that has already been most ably done by our indefatigable Secretary. Nor do I intend to prepare an extensive review of the proceedings of the Board, for that part of the work has also been very satisfactorily performed, and has, from time to time, appeared in the printed transactions, under the supervision of the Secretary. But I do propose, in a short essay, to submit some general remarks on subjects connected with the business of the Board, and in undertaking this task, I do most frankly admit, and sincerely regret, that the selection for the performance of this duty could not have fallen upon some other member, more worthy and competent than myself. Permit me, however, to congratulate the members of the Board, and the citizens of the State generally, upon the organization of the State Board of Agriculture. It is an institution long needed by the wants of the people, and it is well calculated, under judicious management, to accomplish much good. And now that it has been on trial for nearly three years, it is to be hoped that it may prove the harbinger of better times for the agricultural, horticultural, and industrial interests of the State.

Spring time has come and passed. The last vestiges of summer are gone, and the fall time is fading away with the departing year. The harvest has been gathered, and the barns are filled with the fatness thereof. Fruits and vegetables in season have loaded the orchards and gardens, and the heart has been made glad from their abundance and excellence. The garden gates and barn doors are closed. The tools and implements for harvesting the crops of the garden and field are safely put away, or should be, and the various employments for the winter months are talked over, and prepared for the approaching season.

The history of the people of this State, is remarkable for their advancements in agriculture, horticulture, and mechanical pursuits, and the success which has attended these enterprises is beyond all human calculation. The general happy condition of the people, and their general prosperity, (irrespective of the financial troubles here and there,) prevails to an almost unlimited extent within the borders of the Commonwealth.

The present age is most remarkable for discoveries and improvements, and this is not only the case in one branch of human industry, but runs through all the callings that are pursued. The many patents and labor-saving machines which have been invented and brought into use of late years, is a most wonderful type of man's ingenuity and skill. Whoever will take time to reflect on the advancements made in all the branches of industry, must acknowledge that there is a growing spirit manifested amongst all classes of our enterprising citizens, to get such information as will help them to reach the goal of their ambition. And the means for acquiring knowledge in all the branches of industry, and for prosecuting scientific subjects, is open to all who may be so inclined. "*Nil desperadum*"—nothing is to be despaired of.

The earth, and the fullness thereof, is a sacred trust, and the duty of man is to put it to good interest. "Originally yielded to man as a garden, shall we return it to the Giver as a wilderness? Not if we feel the solemnities of our trusts. Not if we are true to ourselves, and faithful to our children." If then we love our State, and all its advantages, and would transmit to our posterity the blessings we are permitted to enjoy, how necessary and important is it our duty to stamp a dignity on labor, and to urge upon our people the use of every laudable effort in skill and enterprise, that has for its object the bettering of our already advanced fellow-citizens. And in the pursuit of this noble and praiseworthy effort, I venture the opinion that the State Board of Agriculture is doing all the good that it possibly can, under its legitimate organization.

On January 24, 1876, Dr. John P. Edge, member of the House of Representatives from Chester county, introduced and had read in place a bill to establish the State Board of Agriculture, and in due course of time the same finally became a law on May 8, 1876, and on February 1, 1877, a meeting of those entitled to membership was called, and the Board was duly organized. Its duties have been so well defined by our Secretary, on page 18 in the first annual report, and in my opinion so well covers all the necessary ground work, that I here quote from it as follows:

The Duties of the Board.

"The act forming the Board, defines its duties only in a general way, and it is evident that it was the intention of the Legislature that it should, within certain limits, arrange and prescribe its own duties. Such being the case, it is evident, that these duties will be more or less governed and directed by the contingencies which from time to time arise. The duties of Secretary of the Board include a large and varied correspondence with the leading agriculturists of this and other States, and with those noted for their interest in agriculture and agricultural improvement; the general drift of this correspondence will indicate the course of public opinion, as well as public needs, and the report of the Secretary to the general meeting of the Board, may be regarded as the reflex of this opinion; from this they may direct their work, and with their own knowledge of the needs of farmers, will, within certain limits fixed by the law, form their guide."

The labors of the Board during the three years, or first term of its existence, will end in January, 1880; and during this period nine meetings have been held in different localities in the State, and at these meetings over eighty-five essays have been read, and many interesting topics connected with agriculture, horticulture, mechanics, &c., were discussed; and here I desire specially to refer to the report of the commission appointed to investigate the Guenon system, a subject replete with interest and of great benefit, I hope, to the dairymen and farmers. The commission gave the system a fair and full test, and so far as I am able to form an opinion, after listening to both sides, I am induced to believe, that the system is founded on correct principles. As an evidence of the interest taken in the report twenty-five thousand copies have been distributed, and the demand still far exceeds the supply. Of all the work of the Board, this seems to be the most attractive and important. The passage of the law "To regulate the manufacture and sale of commercial fertilizers," also the law "To prevent the spread of contagious or infectious pleuro-pneumonia among the cattle in this State," may be classed among some of the important measures which the Board, through its Secretary, has accomplished. The greater part of this labor has from time to time appeared in the printed matter of the

Board, and sent out to the people, and of its value, benefit, and importance, all who are interested and engaged in such pursuits, must be the proper judges.

To digest and compile all this mass of interesting and useful infarmation into proper book form, besides keeping up an extensive and varied correspondence in and out of the State, his office being the center, not only for the collection of all agriculture information, but also for its dissemination among those who are most directly interested, has demanded an immense amount of work at the hands of our Secretary; and only those who have some idea of the labor done and required can appreciate and comprehend the work that is done. For his faithfulness in office, attention to its duties, and severe labors, he deserves the thanks of the Board and of the citizens of the State, and better remuneration, or there should be some provision for an assistant for, at least, a portion of the year.

The Past and Future.

Every class of good citizens rejoices in reviewing the past, and looks forward with pleasure to the future. Of the past, those of us who have served as members for three years, or the first term, some doubtless will be returned, whilst with others their places will be filled by new members. Whatever may be the result, it is hoped that the work of the Board will continue onward, as it has been progressing, and from month to month, and year to year, spread its labors before the people, bearing evidence of good health and increased information. And in whatever light it may be viewed, and under what circumstances considered, the meetings of the Board have always been pleasant and instructive to myself, and I trust of benefit to the people. I hope I will not be charged with undue flattery in expressing my belief that in the amount of profitable information disseminated amongst the people of the State, the labors of this Board will compare favorably with similar organizations; and in this connection it is hoped that the State Legislature, in the exercise of its wisdom, will not fail to adopt more liberal measures for the better advertising and spreading before the people matter relating to the agricultural, horticultural, and industrial interests of the State. There has now accumulated in the office of the Secretary of the Board much valuable and important matter that should be made public, but there has been no provision made for its publication. Whilst I, in common with many others, sympathize in the great necessity of economy in all things, I nevertheless am of the opinion that an annual appropriation by the State of a few thousand dollars, and judiciously expended for such purposes, as are here indicated, would be good economy in the end.

Of the future of the State Board, my friend and fellow member, Dr. Edge, of Chester, at the May meeting, 1877, read an interesting essay on this subject, (see page 240, First Annual Report,) from which I respectfully extract the following: "That future and those possibilities will, in brief, be just what the farmers of Pennsylvania shall have them to be. If they, in the spirit of progress that is active all around us, and in all the departments of industry, shall take this work in hand, and build up and establish on a firm foundation, their class interests through its machinery, there can be no doubt about its future. But if influenced by old ideas or prejudices, and stimulated by adverse action from the fear that it will clash with other agencies, or that the expenses will outrun the good results, or from suspicion that political or other influences may control it, then its field of action will be hedged, and its results therefrom imperfect and unsatisfactory." Again: "The law of 1876 makes the membership depend on the existence of a live and active local society. These local societies have therefore the absolute of the *personnel* of this board, and its results depend largely on the class of men they send here to represent them." And again: "And why may not Pennsylvania, with her free systems of education and government, march on, even in the tread of empire, not only keeping her sons and daughters on her own soil, home-bound because prosperous, but by her wise and liberal systems attract millions from without to share her happiness, and increase her wealth? As the first requisite to this she must foster her farming interest. This can best be directed by an authorized power in the machinery of government, that can point its general aim and purpose. This brings us directly to the question: The future of this Board. What can it do, or what is its aim? The answer, in brief, may be stated, that it shall develop more enlightened, skilled, and scientific farming, and test all systems and methods, as well as materials and machinery, by the power in its keeping."

And now, in conclusion, as we will soon be called upon to bring the work of this meeting to a close, I desire before we part to express my high respect, and sincere regard, for all of my fellow members, and to say to one and all, that these meetings, during the past three years, have been amongst the most pleasant and agreeably of my life.

WHAT CROPS ARE MOST PROFITABLE IN THE CLEARED PINE LANDS OF PENNSYLVANIA?

By JOEL A. HERR, *Member from Clinton.*

It is to be regretted that the advisory committee did not assign this subject to one whose personal observation extended over a greater portion of the pine lands of the State, than my own. At best, I can give but a partial and limited solution to this important question.

By the " Cleared pine lands of Pennsylvania," I understand is meant the great lumber region extending from northeast to southwest, through the State, comprising a part of the Allegheny mountain system; or more especially that portion of it which has recently been denuded of timber, and is adapted to agricultural purposes. This tract includes lands in perhaps thirty counties, in the most elevated parts of the State. Their adaptation to agricultural purposes was treated in an essay, by Hon. A. J. Quigley, at the September, 1878, meeting of the Board, showing that the soil is capable of producing all of the cereals, and most of the fruits and vegetables in abundance.

In ascertaining the most profitable crops to be grown in these lands, there are many important subjects or conditions to be considered, among which are the condition and capabilities of the soil, the altitude and consequent climate, the proximity to, and the kind of market afforded, and the access to railroads.

These conditions, though varying somewhat in different parts of the State are in most respects very similar. The lands have the same general char acter and altitude, and when stripped of their timber, are left in similar condition. After being cleared, and burned over, they are usually in good condition for first crops, without the application of any stimulant. Good cultivation is all that is necessary. The crops most easily and successfully grown, (so far as my observation extends,) are wheat, rye, oats, buckwheat, and potatoes, and other vegetables. The altitude of these lands, and consequently shorter season, makes them less desirable for raising corn and tobacco. Yet in many of the valleys, these are important and profitable crops.

As many of these lands are remote from cities and large towns, their principal market now is found in supplying the lumbermen, oil producers, and collieries of their respective localities with supplies for themselves and teams, hence oats, rye, and potatoes, in which these lands excel, are very remunerative crops. When these sections are well supplied with flouring mills, grain will be more extensively raised.

These lands are natural grass lands, hence stock raising is a very desirable and profitable business. The distance to railroads is in no instance so great that stock of all kinds may not be marketed with comparatively little expense. Thousands of acres of these lands are now being pastured by cattle, which have been driven there long distances in spring, to be brought back in autumn; and, notwithstanding many of them are lost, it is still considered a paying business. With proper legal protection from the ravages of dogs, sheep husbandry would meet with extraordinary profits.

The agricultural fairs nearest these localities show that these lands excel in the productions of vegetables. Enormous specimens of potatoes, beets, squashes, onions, cabbages, turnips, &c., on exhibition outrival those produced in the richest agricultural counties in the State.

The superiority of these lands for raising oats and root crops, together with the natural pasturage of the country, make butter and cheese dairying a productive industry.

It has been satisfactorily demonstrated that many of these lands are admirably adapted to fruit growing. Occasionally, the fruit is injured by the late spring frosts, but this is the exception rather than the rule. In my opinion, there can be no more profitable investment on these lands than a judicious expenditure of money for the planting and rearing of an orchard of apple and pear trees. It will certainly require some knowledge and discretion in the selection of the most suitable varieties, and in their culture; but not beyond the reach of any ordinary farmer who will endeavor to inform himself on this subject.

The distance to a profitable fruit market is not greater than are the best fruit growing regions of New York. Of bee culture, I know but little; but it seems to me that, as these lands are superior for buckwheat and white clover, it might be made a profitable industry.

In many of these pine lands, agriculture has been but a secondary pursuit, lumbering being the primary; and it is only since the stagnation in the lumber trade that the capabilities of the soil are being tested. The few acres under cultivation were seeded year after year to such exhaustive crops as buckwheat, rye, and oats, with but little rest, and no return to the soil of any fertilizing material, until it had become exhausted, and the casual observer was led to believe it to be worthless. Experiments with fertilizers in numerous instances have demonstrated that these soils will repay the service rendered them. The application of lime produces a most desirable effect.

The greater portion of these lands being destitute of limestone, lime must necessarily be transported there by railroad.

Were it not for the unjust discrimination in freights by the railroads of our State, these lands would be much more desirable for agricultural purposes. In some of the valleys that this section of land contains, the growing of tobacco has become a leading and profitable industry. Each succeeding year the tobacco growing region is extended, until in the near future we may expect to see the valleys of the central part of our State vie with the best tobacco producing part of our country in this profitable occupation.

It would be simply impossible to designate any one or two crops as the most profitable for these lands, owing to their diversity and their different markets. Among those which I have named, and many others of minor importance, the intelligent husbandman will readily select for himself those best suited to his particular location; and by a system of rotation of crops, and judicious application of fertilizers, will maintain and add to the already natural fertility of the soil.

The man who possesses some knowledge of agriculture, and is willing to labor, will be amply rewarded in the cultivation of much of this land; and when the healthfulness of the country is taken into consideration, it will compare very favorably with the best locations among the cheap farming lands of the far west. If the farmer of moderate means will locate on some of these cheap pine lands, and be willing to endure but half the hardships and privations of a frontier life in the distant West, he will acquire a home and a competence in a healthy climate that will compare favorably with the El Dorados of more distant places.

FIFTEEN YEARS' EXPERIENCE WITH FRUIT CULTURE IN PENNSYLVANIA.

By Asa Battles, *Girard, Erie County, Pennsylvania.*

There is no country on the globe that will produce, with so little trouble and care, such a variety of fruits as our own. Apples, pears, peaches, plums, and quinces, are the common large fruit; while we have strawberries, raspberries, blackberries, currants, and grapes, among the small fruits that are common, and grown more or less by most of the farmers in this section of our country. Having been engaged quite extensively for a number of years in the cultivation of most of these, I shall endeavor to give others the benefit of my experience; confining my remarks, principally, to planting and growing them, mostly for market, the different varieties, how to plant and care for them, and dispose of the fruit when grown.

Before planting your orchard, vineyard, or berry plantation, have your land in good condition, manure it well, plow deep, and fit your fields as you would, were you intending to raise one hundred bushels of corn per acre. I assure you, it will well repay you in the growth of your plants or trees will make. If you desire to plant an apple orchard, first select the location, do not select some stony hill site, but the best field on the farm. If it is in grass, plow it deep, and plant to potatoes. The next spring plant your apple trees, put them in rows two rods distant each way, planting them a very little deeper than the they stood in the nursery, pressing the soil around the tree, and over the roots firmly with your feet; mulch each one with coarse straw manure, and plant the ground again to potatoes, or some other low hoed crop, manure each year, and continue to raise hoed crops, for, at least, five years, after planting the trees. Judging by past experience, the crops will pay for the manure and all the labor you bestow on the orchard.

Be careful to remove the mulch, and any grass or weeds around the body of the tree, and each fall bank up around it with fresh earth a mound not less than one foot in height. This will prevent it from being girdled by mice, also from being loosened and bent by the winds, when the ground is soft, in the spring or fall.

When you set the tree out, with a sharp knife cut away nearly all the branches, making it look like a whip stalk, also cut off smoothly any of the roots that may be broken or bruised.

Each spring before the buds or swollen, remove all the branches necessary to form a good shaped head, and all the pruning needed can be done with the pruning knife for a number of years. When, for any reason, you wish to remove large branches, do it with a fine toothed saw, as it does not bruise and injure the bark as much as heavy pruning shears.

Always bear in mind, to prune in winter or early spring for wood, and summer for fruit. If your orchard is on clay soil, it is best to always plow towards the trees, this will soon form a mound around them, giving much deeper soil for the roots, and good surface drainage in the center of each row. After you have kept the orchard in hoed crops for five years, you can seed it down to clover, and make a pasture for swine or sheep. Horses or horned cattle should never be permitted to run at large in it at any time. If the soil is clay, after once seeded down it should never again be plowed. For the roots will extend over the whole surface, and not penetrate the ground sufficient to escape the plow. I have seen orchards nearly ruined by the roots being cut off, many of the large trees being blown over by the first heavy wind, and those that escaped became sickly, and commenced to decay. On sandy or gravely soil, the roots penetrate much deeper, and plowing occasionally will prove beneficial.

In growing apples for market, you need but few varieties. I have found the most profit in very early and winter sorts. The Red Astrachan is a showy apple, a good bearer, and sells well. Of winter apples, the Baldwin has proved the most profitable. It bears heavy crops alternate years. Succeeds on all soils. The tree is a rapid grower and attains a large size. The fruit always commanding the highest price in market. The Rhode Island Greening, of late years, is badly affected by insects, and is proving a shy bearer. Green apples show their imperfections more than red ones, and do not sell as readily. The Ben Davis, or New York Pippin, is a red apple, an annual bearer, but is not of very good quality. Has proved very profitable in the West, but has not been tested long enough here to prove its value. So far, I am very favorably impressed with it. Smith's Cider, Willow Twig, and Northern Spy are good apples, and good bearers, but have not succeeded as well with me as the Baldwin.

For market, would set out fully three fourths Baldwins, the balance would divide up equally with Red Astrachan, Ben Davis, Smith's Cider, Willow Twig, and Northern Spy. For family use, the list should embrace greater variety—both summer, autumn, and winter.

Insects are rapidly increasing. When young, it was the exception to find a wormy apple, now it is the exception to find a sound one. Some seasons nearly all are imperfect. Unless something is done to check the evil, I fear this most valuable of all fruits will be nearly ruined.

The insect that is doing the most damage is the circulio or plum weevil, a small beetle that forms a crescent-shape puncture on the small apple soon after it is out of blossom, in which it deposits an egg, which hatches into a small white worm that eats into the center of the fruit, causing it prematurely to fall from the tree.

As a general thing the larvæ remains in the apple till it falls to the ground, when it soon emerges and enters the soil, where it remains until the next spring, and comes out the perfect beetle. If all the fallen fruit could at once be gathered up and destroyed, its ravages would soon be stayed. The best remedy I know of is to keep a sufficient number of swine or sheep in the orchard to eat up the fruit as fast as it falls. If all would practice this, our apples, pears, peaches, and plums, would be much more perfect as well as more abundant. This beetle preys on all fruits, such as apples, pears, peaches, plums, cherries, and apricots. Plums, cherries, and peaches, are often entirely destroyed. Pears are rendered very imperfect in form. I have often noticed a dozen of the crescent-shaped punctures on a single pear.

Another insect, that in many sections is destroying nearly all the fruit, and seems to be increasing in our Lake Shore region very fast, is a little beetle called the rose chaffer or rose bug. It makes its appearance in such vast numbers that it is impossible to stay its ravages. It does not seem to be particular in regard to its food, as it feeds indiscriminately on nearly all kinds of plants and fruit. It makes its appearance in the spring, about the time when grapes blossom. They come in such swarms that a whole vineyard will be stripped of its blossoms and fruit in a day or two. The little green apples and peaches will be covered with them, looking like dark balls the size of a black walnut. Not satisfied with destroying the fruit, they sometimes will strip entire trees of their foliage. I have also found them very partial to my red raspberries. This season, near my residence, a strip of country about ten miles long and five miles wide, all the grapes, peaches, and cherries, were almost entirely destroyed by them, and the apples badly injured. A farmer, telling me about them at his place, said they were like a colony of bees swarming all the time. They were very thick on my orchards and vineyards, but for some reason or other failed to do much harm.

There seems to be no remedy but hand picking, and destroying them, which would appear to be a hopeless task, when the air is full, and they appear like a cloud of Kansas grasshoppers. When a section of country becomes infested by them, they always remain, and, at the same time, each spring come with great regularity. I should not advise extensive fruit plantations in such neighborhoods. They do not seem to propagate on clay soil as freely as on sand or ground.

There are many other insects injurious to apples, but time will not permit me to allude to them at present.

For peaches let the soil have the same preparation as the apple orchard. Set out the trees, sixteen feet distant, in rows each way, giving them the same cultivation as the apple tree. For market purposes, plant but few varieties. Very early and very late sorts I have found the most profitable. The Smock, although not a peach of the best quality, has given full crops almost every year, and, coming when other kinds are nearly gone, it sells for a high price, and meets with a good demand. I have in my orchard a succession from the 1st of August to 1st of October. I get the best prices for the early and late.

The Hale's Early, a hardy and handsome peach, blossoms and sets a full crop. Almost invariably nearly all rot on the tree.

The Crawford's, both early and late, two of the finest we have, are very shy bearers, and, in my orchard, do not average a crop once in five years. Early Beatrice bears well, and is quite free from disease. The objection is its small size. I now plant eighty out of each hundred to the Smock. For family use, a larger variety should be grown, in order to give a succession throughout the season. So many new varieties have been propagated recently, it is difficult to name the sorts that would be most desirable.

The insects that are doing the most damage in the locality where I reside are the rose chaffer, curculio, and borer. I have already alluded to the two former. The best preventative to the ravages of the borer is to put a peck of air slacked lime around the body of each tree early each spring. The only pruning necessary is to remove the dead branches, and shorten in about half of the previous year's growth each spring.

Pears have proved so unsatisfactory, owing to the blight, I should hardly recommend planting on a large scale for market.

I set out twenty-five hundred in my orchard. They made a fine growth, and had began to yield fine crops. When about eight years old, the blight appeared, and now, they are more than half dead, and the balance so badly affected they are of little value. The most profitable varieties for market are the Bartlett, Flemish Beauty, Duchess, Sheldon, and Seckel. The blight is so well known to all I shall devote little space to its discussion. Its origin and cause has been a subject of much speculation among our most distinguished pomologists; its effects we all know. Among the hundreds of remedies that have been discovered, none have proved to be of value. It seems to prevail some seasons very generally throughout the whole country, destroying nearly all varieties. Certain localities are often exempt for a number of years, when the orchardist begins to congratulate himself that he has escaped the dread visitation. His fine pear orchard in a few days presents the appearance of being scorched by fire, and the work of years is destroyed in a few weeks. Should an effectual remedy be discovered we may expect to see rich lucious pears more plenty and cheaper than apples are now.

Small fruits recently have proved in this part of the country much more profitable than large. But competition is becoming so strong and prices so low that only those who cultivate thoroughly, and grow fine fruit, and good crops, can expect to make the business remunerative. The markets of our large cities are so overstocked, that often, after deducting freight and commission and the cost of picking, there is very little left for the grower. This season, strawberries have been sold in most of the large markets for four and five cents per quart. The cost of picking, crating, and delivering to the railroad cannot be less than two cents; the express charges will be from one to two cents, according to the distance shipped; the commission half a cent; the loss of boxes and crates is quite an item; consequently, you will perceive, the margin of the shipper must be small. I have found it more economical to sell and transport my own fruits. I can send a load on one of my fruit wagons twenty-five to fifty miles, and sell it from the wagons much cheaper than ship by railroad to a commission merchant.

I made a profit of over four hundred dollars from one and a fourth acres of strawberries this season. My ground was in good condition, I permitted no weeds to interfere with the vines. I had a large crop of fine berries, and sent them with my own teams to the local markets. I had no express charges nor commissions to pay, and sold at better prices. I picked from that plot two hundred and seventy-five bushels, and sold them so they netted almost five hundred dollars. The cost of picking was less than seventy-five dollars. Other parties, in the same vicinity, sent their berries to large cities, and sold through commission men. Did not receive enough to pay expenses, getting nothing for their fruit.

The ordinary farmer will not, as a general thing, make fruit growing for market pay, he must neglect his farm crops or his fruit, as both need attention at the same time, it is better to make a speciality of one or the other, in order to make a success. To be successfull in fruit growing, it is best to cultivate the different varieties, commencing with strawberries, which ripen in June, the raspberry in July, the blackberry in August, along with early peaches, pears, and apples, to be followed by grapes, peaches, pears, and apples during September and October, closing up the season with winter apples. The same crates and boxes answer for all kinds of berries, and I use the same baskets for grapes, peaches, pears, and apples. You have plenty of work for your help, which can be hired for less wages during the entire season than for a month or so. Can keep your teams busy all the time, and hold your customers.

Strawberries I plant in rows four feet apart, and one foot distant in the row, using the cultivator and hand hoe to keep them from grass and weeds, mulching them in the fall with spent tan-bark, saw dust, or straw, which ever is most convenient. In early spring removing the mulch sufficient to permit them readily to come through it. I have not tested many of the new varieties very thoroughly, the Cresent Seedling is the most thrifty growers I have ever seen, the vines cover the ground like a mat, smothering out small weeds and grass almost entirely. From a small plot of ground, the tenth of an acre, I picked of this variety forty-seven and one half bushels, or at the rate of four hundred and seventy-five bushels per acre, while the Wilsons, adjoining in the same field, with the same cultivation, yielded about one half that amount.

The Crescent is a bright scarlet color, a little larger than the Wilson, is firm, and carries well to market.

The Wilsons were badly winter killed. Should think fully one third of the plants were hove out. The Crescents were not injured in the least, with precisely the same care on the same soil. The Cumberland Triumph succeeds well with us. Bears very fine large berries of excellent quality. I think it one of the most promising sorts.

The Monarch of the West, while it produces very large berries, of fair quality—but the end of the berry remaining uncolored when ripe gives it a bad appearance—does not sell well in market. The Wilson has been our principal berry; but I shall discard it, and plant the Crescent instead.

Raspberries should be planted in rows eight feet apart, and plants two feet in the row. It will, the second year, form a hedge, the canes supporting each other against wind storms.

Give them good cultivation. Keep free from weeds and grass. Mulch heavily with coarse manure or straw, pinching the canes off when two to three feet high, and you may be assured of good crops for a number of years.

The Mammoth Cluster is our principal berry. I have discarded the Thornless, as the bushes generally blighten when the berries were about half grown. The Doolittle is a great bearer. But the small size of its fruit is an objection.

Among the reds, the Highland Hardy has given me the most satisfaction. Always bears a heavy crop of fair sized berries. Ripens just before strawberries are through, enabling us to make out our loads with a part of each.

The Philadelphia, Franconia, and Hustons are great bearers of large berries, but are very soft for market. The Brandywine, the market berry for Delaware and New Jersey, has never borne well with me.

The blackberry should be planted in rows, at least, eight feet apart, and two feet distant in the row. Give them the same treatment as the raspberry.

The Snyder is a most wonderful bearer. Ripens its fruit as the Mammoth Cluster begins to fail. Is very hardy. Not liable to be affected by our cold winters. Is not as large as the Kittatinny, Lawton, or Wilson, but much more reliable in this latitude. The Britton, a native of Wisconsin, is well spoken of. Said to be very hardy. The fruit is large. I have not yet tested it. Missouri Mammoth is of little value. Is more tender than the Lawton.

Grapes follow blackberries in the succession of small fruits. My experience has been mostly with the old varieties. Have found the Concord the most profitable, bearing heavy crops each year, and until recently exempt from disease. It has proved very hardy; a few years since, when nearly all my vines were killed to the ground by the extreme cold winter, the Concord was very slightly injured, and bore a fair crop. I have the Ives planted quite extensively, it is hardy, bears fair crops, and ripens about one week in advance of the Concord. The fruit should be picked as soon as ripe, or the grapes will soon fall from the stem. The Hartford is very productive and hardy, but rather poor quality, and sells for less in market, it ripens with the Ives. The Catawba, as all are aware, is a very good wine colored grape, bears well, but is quite subject to the rot or sun scald. It ripens late. Is liable to be destroyed by early frosts. It proved so unsatisfactory with me, I dug out one thousand vines, and replaced them with Concords. The Isabella is of good quality. Has generally borne fair crops. Is rather late, and not very solid this season. For the first time, has suffered considerable from decay. The Delaware is a fine grape of small size, amber color. The vines are slender growers, and the crop rather light with me. It generally loses its foliage early in the season, and fails to ripen its fruit. The Iona is tender and unreliable, sometimes producing large bunches of very fine fruit. The Salem has generally done well, bearing large crops of very fine grapes. Sells well in market. I have tested very few of the new varieties.

The insects that have done most damage on the lake shore, are the grapevine flea beetle, or (as some call them) the little steel blue black bug, and the rose chaffer, generally known as the rose bug. The first commences to prey on the buds soon after they begin to swell in the spring, eating in to the center, frequently nearly destroying them. Their larvæ appears on the full grown leaf, in the shape of a small slate colored worm, about three eights of an inch long, and about the diameter of a darning needle. They damage the foliage considerable, and often times almost entirely destroy the blossoms, ruining the crop when they appear in large numbers. The only remedy I have found was catching the beetle and destroying it, when it is at work on the buds. This may be done by taking a dish partly filled with water, and holding under the branch where the beetle is, and jarring it into the water.

When you get a sufficient number in the dish, scald them. We have caught them by the thousand in that way, taking warm sunny days, when they come out from their hiding places.

The rose bug I have already spoken of, and should hesitate about planting a vineyard in localities frequented by them.

In planting a vineyard, the usual practice has been to plant vines about eight feet distant each way. I am of the opinion that eight by sixteen, or even twenty, feet would be better, and train them on a wire trellis, giving them more sun, better ventilation, and obviate such close prunning, I think, would render them less liable to be affected by mildew, which has appeared on Concords, more or less, for a few years, on old vines. On young vines, having more room, they have thus far been exempt.

Any soil that will produce a crop of corn or potatoes will be rich enough for grapes. Too rich soil and high culture is apt to stimulate the growth of the vines at the expense of the fruit. A vineyard, six or eight years old, in good condition, will produce from four to six tons of fruit per acre, which will bring in market from three to five cents per pound.

In alluding to so many varieties of fruit in so brief an article, I have been obliged to condense my remarks, and, doubtless, have omitted many things I ought to have mentioned.

My advice to those contemplating the planting of fruits of any kind would be in no case to purchase your plants or trees from the so-called fruit tree agents, who are now so numerous in every portion of the country. Where I live, quite a class of people are engaged in that business. Very few are responsible, and scarcely any reliable. Plants and trees that cost them five to ten cents are sold to farmers for twenty-five cents to one dollar. Instead of delivering the variety contracted, they furnish such as they can purchase the cheapest. Knowing so much about their impositions on the public for so many years, it is a matter of surprise to me that a class of men as intelligent as our American farmers will permit themselves to be imposed upon and swindled so much. In every agricultural paper in the country will be found the advertisements of nursery men who are permanently engaged in the business, and whose success depends upon their character for upright and honorable dealing with their customers. Send to them for their catalogues and prices. Select the varieties you desire, and send them the order, and in ninety-nine cases out of a hundred you will receive the kinds you order, and at prices that are reasonable and just.

In this article, I have endeavored to give plain, simple directions to the inexperienced, or any one contemplating making fruit plantations. The many details will only be acquired by experience. If engaged on a large scale, the fruit grower must expect to meet with many mishaps. One year I suffered a loss of over two thousand trees in my orchard by the depredations of mice alone. I had taken the ordinary precaution of banking up my trees, after removing any grass or other rubbish from them, but the mice were so numerous, all ordinary preventatives were unavailing. They penetrated the ground in every direction. They dug under the mounds around the trees, and made nests in them. Trees from four to six inches in diameter were denuded of every particle of bark from way down on the roots, to one foot in height. Even some old trees one foot in diameter were destroyed.

Another year we had a snow storm, and freezing weather in October, when our trees were in full leaf, and the bodies full of sap. The next spring over one thousand died from the effects of that storm that were about eight years old, and large enough to produce fruit.

Another source of disappointment will arise, when your trees begin to bear. You will find the fruit you expected, will be some other variety. I bought five hundred Baldwins from a reliable nurseryman, (as I supposed,) which all turned out to be Jonathans, which, of course, was not discovered until several years after planting.

Fruit growing is a healthful, pleasant occupation, when it can be so conducted as to make it profitable. I know of no business that will bring more real enjoyment.

As fruit becomes more plenty and cheaper, the consumption of it is greatly stimulated among our own people, and foreign markets open up to us, taking the surplus.

My correspondents report almost a total failure of the apple crop this season in England, and that American apples will meet with ready sale, at good prices. I am sorry that our crop on the lake shore is so short we cannot take advantage of it. But in many sections of our country, there will be a large surplus that can be exported to good advantage. Many thousand bushels are now annually being manufactured into apple jelly, which makes a fine sauce for the table, and by many relished as well as jelly manufactured from currants. I can see no reason why fruit growing, conducted in a careful and proper manner, will not continue to be as profitable as any other agricultural pursuit, and, by many, considered much more agreeable.

A MEMBER, (to Mr. Battles.) Does the gentleman know any way to save this season's apple crop? This year the season is telling on apples. The Rhode Island Greenings are mellow now.

Mr. BATTLES. This fall I observe the apple crop is ripening much earlier than usual, and it should be picked earlier. The only way to save apples for winter is to pick them before they get ripe on the trees. Of course, if they ripen earlier, they will decay if not picked before the usual time. They should be kept in a cool place after picking. My practice is, having a fruit-house, to put the apples in there as soon as we pick them, and leave them until freezing weather comes. There is no floor in the fruit-house. We put down sawdust, scattering it around; and sometimes we scatter it over, two or three feet deep, and sometimes four to six feet deep; putting the apples in piles, and leaving them there until the weather gets cold and freezing, unless the apples are sooner sold. We never sell winter apples unless by car load. When sold, we ship them as soon as possible. I practice selling winter apples in the fall, if I can. I have a large cellar; and after barreling I put them into the cellar; and if we sell before towards spring, we send without re-packing. If late, we re-pack. That is our practice with winter apples. In the western part of Erie county, the apple crop is almost a failure. For some reason, in Chautauqua county, the season for the bearing crop is changed. Next to Chautauqua county, and in the State of New York, they alternate with us.

Mr. M. C. BEEBE, of Crawford. And it runs right down through Warren county down to the Allegheny river; yet our crop is just as abundant as theirs this year. But I observe, in central Crawford, and this gentleman's county, it is the same as the gentleman says.

Prof. F. A. ALLEN, of Tioga. I would like to ask about seeding down. I have planted an orchard, and put the ground in potatoes this year, and it has been either in potatoes or corn ever since planted. I learned in a fruit growers' journal that it is bad to seed in oats. I get better results after oats than anything else.

Mr. BATTLES. It is bad practice to ever sow oats or other grain in an orchard. In the paper, I stated we lost two thousand trees with the mice. We were foolish enough to put in a crop of oats. Our orchard was somewhat extensive, being seventy-five acres. We had the creatures near the ground the season before in a beech woods, and the following season the mice came in myriads. The oats not only brought the mice, but checked the growth of the trees. I should prefer sowing in grass. If I wanted to seed in timothy or clover, I should sow the timothy seed in the fall, if I could sow it early enough to get it to catch. I should think it was rather late now. I think timothy would be rather likely to kill out. It ought to be up now. I should prefer mixing in the seed. Drag the ground thoroughly, sow the seed early, and you will get a good catch next spring. I would not plow.

Mr. J. A. **HERR**, of Clinton. The proper construction of a fruit room or a fruit-house, I think, is an important subject. A friend of mine has constructed a fruit-house adjoining his ice-house, and he is very careful to keep it at a proper temperature. I went there in May, and found apples that had long passed from market, in a perfect state of preservation. He tells me that he took apples that could be bought for twenty-five cents in the fall, and kept them until he could sell them at seventy-five cents. He says it is the most profitable investment he has made—to keep his fruit there until the fruit of others had gone. He certainly showed us some very fine fruit, solid, and in good keeping condition, in the latter part of May.

While I am on the floor, another question. I think that the farmers throughout our section of the country—and I guess we are no worse than other people, are too often humbugged by fruit-tree agents, not only in regard to quality, but quantity. An agent came to us to sell some grape vines, and among the varieties was the ———. I asked the price, and the sum given was rather high—one dollar and a half each—that they could not be got for less. Says I, "Gentlemen, you are rather high; you ought to sell such grapes at half a dollar." "No, they could not be produced at a dollar each." Then I said, "If you will agree to give me a hundred dollars, I will supply you with a hundred vines within a week." I backed them down. They said, "You wont get them from Geneva at that price;" and I said that I would get them. I didn't know the price; but I looked over a price list after they were gone, and found that I could buy them for thirty dollars a hundred, for one-year old vines; and for forty dollars a hundred, if two years old. The idea was to run in this new variety at a dollar and a half apiece, and we farmers to be the humbugged. In this case, I sent in my orders for two-year old vines, and they did not cost me over half a dollar apiece, expressage and all.

Mr. M. C. **BEEBE**, of Crawford. I know it is late; but in our discussions it is well enough to talk about the importance of these things, even though an extra half hour is taken up. What I want to get at is something whereby all will have more of a benefit from our fruit crops; the farmer as well as the consumer. The preservation of our apples can be effected cheaper than has been suggested. I found myself, two years ago, very much in the position the gentleman has stated. I adopted, however, the old method of trying to save some of my fruit. I had a quantity carefully picked, and put in cracker barrels, pressing them down solidly; and keeping those barrels down under the trees until somewhere near Thanksgiving. Any farmer can do this. Pick them carefully, or even at this time the late winter varieties will rot. Then, after Thanksgiving time, put them into the barn, and let them be until Christmas, unless there is a severe amount of freezing; because apples will stand cold better than heat. In this way, I had no difficulty in keeping them, even the earlier varieties. Of course, as our friend remarked, it is quite important to pick the fruit at the proper time.

While I am up, I wish to say a few words on another kind of fruit. Almost every man has from one to half a dozen plum trees; but, as a general thing now, they do not bear very well, on account of the curculio. A man in our place, twelve years ago, placed mulch under his plum trees, never disturbing it. For twelve years, whenever there was a plum crop, his trees were loaded with plums, while the neighbor's trees were devoid of fruit of this description. This year we had resorted to various other experiments, and we found two things were successful. They could not so well be tried in a large orchard; but they have been absolutely successful. One is to smoke up the trees at the proper time with what is called "coal tar;" and taking portions of the "B. S. oil" of the refiners; alternating by taking every other tree. They have been loaded when the other trees have not had any.

Another experiment has been a success—by taking the finer coal ashes, and throwing them over the trees. In no instance, where these have not been applied, have trees had a quart of plums; and yet, when these experiments have been made, the trees have been thick and substantial bearers along every year, without any failure. The time to commence is about when they are going out of bloom. The process to be continued right along for ten days or two weeks.

Mr. **KELLER**, of Schuylkill. How long do you have to continue to smoke them?

Mr. **BEEBE**. About the same time; say two or three weeks.

Mr. **HENRY**, of Clinton. I would add to what Mr. Beebe has said, another remedy that has been found in our section. A man told me that under trees where tansy grew in quantities, there would be crops of plums, if any would appear at all. Where there was no tansy, there were no plums.

Dr. **ROLAND**, of York. I did not hear it, if the essayist referred to the cherry. In my section of the State, we consider the cherry one of the sureist and most profitable crops for export that we can produce.

Mr. **BATTLES**. We do not raise the cherry on our farm at all. We have cherries on our lot in town. The curculio has been so bad that the crop has been uncertain. And since the "rose chaffer" has been there, he takes all himself.

Dr. **ROLAND**. We have no such difficulty with us; but raise thousands of bushels.

Mr. **BATTLES**. I have no doubt that cherries could be made a success. We have a market for them. Most farmers had a few trees, but a few years ago the black knot killed out all the old sour cherry trees. Two years ago we had cherries in town.

Our trees were all loaded with plums there, and every tree bore without any precautions. I would say in regard to the little Turk, the curculio, that anything that is offensive will often keep him off from certain trees. That can be true in a small way. But it is supposed that this insect goes through the air. I do not see how coal ashes, unless there is some offensive odor about them, will keep the curculio from a tree. The general practice among fruit growers is to fix up a piece of wood so that they can jar the insects from the tree by jarring the trunk, having a sheet fixed like an umbrella to catch them as they fall. In this way in a bearing year you can, without doubt, raise all the plums you desire, by commencing to jar as soon as the curculio begins to work, and and continuing the jarring process for two or three weeks. As soon as the trees begin to bloom, or are white, then begin to look for the little fellow.

Mr. **KELLER**, of Schuylkill. I wish to ask the gentleman what experience he has had with the early varieties of blackberries; whether the vines are sufficiently strong to withstand the climate? I have not been able for a number of years to keep the vines from freezing down for me; which they do almost totally every winter.

Mr. **BATTLES**. We have never cultivated the domesticated blackberry very extensively; but we generally find that the Wilson Early is usually killed in a cold winter; that along with the Kittatinny is unsafe. We find the other varieties much more profitable.

POTATOES—THEIR CULTURE AND BEST VARIETIES.

By Hon. N. F. UNDERWOOD, *Member from Wayne.*

The value of the potato, as an article of human food, can hardly be estimated. What the wheat plant is among cereals, the potato is among vegetables—each the king of its kind; and it would be as difficult to find a substitute for the one as for the other. Their value as food for animals is also sufficiently high to make it profitable, under favorable conditions, to grow them for that purpose. In coming before this Board, to present a few thoughts upon this subject, I do not assume to teach the members of this body, or the farmers of Pennsylvania, how to raise potatoes. Why any body can grow a crop of potatoes! From the track watchman, who plants the narrow unoccupied strip of ground along the railroad, and who, while watching the track, keeps an eye on the "praties" also, and, as he walks along, knocks off, with his stick, "the baytles—bad luck to them," to the college professor, who strolls out into his garden, in dressing-gown and slippers, and peers, scientifically, through his spectacles at the *doryphora decem-lineata*—everybody knows how to do that; and if they did not, and if I had reduced the whole thing to a science, so far as my own locality is concerned, it would be impossible to lay down rules which would be applicable to all the widely diversified conditions of soil and climate here represented, such a diversity as more than two degrees of latitude, nearly two thousand feet of altitude, to say nothing of geological and other not less important variations, make possible, in our State. I shall undertake nothing of this kind; but only attempt to indicate some generally accepted principles, together with some hints suggested by my own observation and experience. I have said that anybody can grow a crop of potatoes; but very many do not grow good crops.

Now, one prime object in growing any crop is to grow it at a profit. I assume, than an acre of ground, planted to potatoes, should yield two hundred bushels, as a minimum crop, one year with another, and that, under favorable conditions, it can be made to produce from that on to three hundred bushels; yet, I believe, I should be within bounds, if I were to say that the average acre in Pennsylvania yields less than one hundred and fifty bushels, one year with another. If these assumptions are correct, the question then is, how can we get the extra fifty or one hundred, or one hundred and fifty bushels per acre; for if one hundred and fifty bushels per acre will pay for cultivation, the excess above that quantity will be nearly all profit. In order to grow a good and profitable crop, two things, at least, are indispensible. The soil must be rich, and it must be dry. A poor soil will, inevitably, produce a small crop, and while a large crop will be likely to grow in a soil that is rich and moist, yet the potatoes will be almost certain to rot, and a dry, mealy potato, grown on a wet soil, is an impossibility. It is not essential that the soil should be sand, or loam, or clay, as any one of these soils can be made to produce a good crop, only in those which have not sufficient natural drainage. The surplus moisture must be got rid of artificially, and, in those lacking in natural fertility, the kind and quantity of fertilizing material needed must be applied, It is the practice, in many localities, to plant upon a newly-turned sod, and good crops can be grown upon sod ground; yet, in a natural grass region, as in my own locality, a sod means tough cultivation, and tough hoeing. I think a better plan is to plant on ground well manured, and planted to corn the previous year. This, with early planting, that is as early as possible after the ground is in good condition, and danger from frost is past, with some special fertilizer applied in the hill, to give the vines a quick and vigorous start, will fulfill the conditions up to this point, upon which a good crop can be grown.

I will not discuss the question as to which is preferable, whole or cut seed. My own practice is to cut so as to leave two or three eyes on a piece, and to put two pieces in a hill—taking care to keep the pieces eight or ten inches apart—plant all sizes excepting very small ones. What depth should the seed be planted? To this I would say, in a moderately moist or compact soil, from three to four inches. In a lighter, drier soil. six inches is none too deep. In the latter case the seed may be dropped in the furrow, but in a soil at all inclined to be wet, the land should be furrowed and the planting done upon the ridges. Where land is cheaper than labor, the crop may be planted in rows both ways, say three feet and a half apart, so as to do most of the work with the cultivator or shovel-plow. The next thing in order is to begin to take the part of the crop against its natural enemies. These are of three kinds; first, the weeds; next, the bugs; lastly, the blight and the rot. Weeds are easily killed when they first start, and among potatoes this may be done by stirring the soil with harrow or cultivator as often as they start. When large enough to hill, the shovel-plow may be used to advantage where the land is not too rough or stony. As to the bugs, their habits, and the methods of destroying them are too well known to need any mention here. As to blight and rot, a distinction is to be made between the two, as rot does not always follow blight of the vines, but sometimes takes place after the crop has matured and the vines dead in the natural way. Both are undoubtedly caused by unfavorable atmospheric conditions, and though not of as frequent occurrence as formerly; yet even now these diseases appear locally to a considerable extent. The blight usually attacks the vines suddenly at a time when the tubers are only partly grown and immature, the consequence of which is a deficient yield and very inferior quality.

It is obvious that any remedy, easily applied, which would arrest this blight, and prolong the period of growth at this critical time, would be of great value to potato growers. Such a remedy, a neighbor of mine thinks he has found in plaster. In 1878, the blight struck his potatoes, as it did nearly all others in that vicinity. Having a quantity of Nova Scotia plaster on hand, he tried the experiment of dusting the vines freely with it, and repeated the application at the end of three or four days, leaving alternate strips without applying any, and he claims that the portions where the plaster was applied continued green, and growing a week or ten days after the others were dead, with a corresponding increase in yield and quality. The question of special fertilizers for potatoes, I consider one of the most important in connection with this subject, and I put it in this way. Can the average farmer afford to buy what are known as commercial fertilizers, to use in growing potatoes? As for myself, I have no hesitation in answering it in the affirmative. I do not pretend to be able to point out to each, or to any farmer, just what kind he should buy. It is morally certain that no one kind would be just the thing in all kinds of soil, and it is not to be supposed that what would be best for the limestone lands of Lancaster and Dauphin counties would produce the same results when applied to the shale and drift of Wayne. The records of the experiments of individuals, and of experiment stations are before the world. We must study them, and learn from them, and from experiments of our own, what is best for our own particular soil and locality. Some knowledge of chemistry, as applied to agriculture, will help us in forming correct conclusions. Barn-yard manure applied in its undecomposed state, directly to this crop, is nearly always unsatisfactory; aside from the fact that such application tends to produce rot, there is the further objection that it is nearly always full of weed seeds, which often receive too little attention, and so choke the crop, and foul the land. When good hard wood ashes can be had in abundance, nothing better in the way of a fertilizer need be desired; but these can seldom be obtained in sufficient quantity. My own experiments with such fertilizers for this crop, have been limited to the use of superphosphate, Manhattan Blood Guano, and potato manure, prepared after the formula of Prof. Ville, and sent out by the Mapes Guano and Fertilizer Company, of New York. My record of these experiments is not sufficiently exact to be of much value here; but I may say that I received the most satisfactory results from the use of the superphosphate, and the least from that of the potato manure. As no two kinds were used the same season, I think it only fair to say, however, that the difference in the seasons, probably, had more or less to do with the success or failure of the experiments. I am well aware that manufacturers of commercial fertilizers expect to make a profit from their sale, whether farmers do from using them or not; but the intelligent farmer will soon learn to distinguish between the valuable and the spurious, and the law enacted last winter, mainly through the efforts of this Board, will afford a remedy against imposition. I think the use of these special fertilizers is bound to increase largely in the near future, and that the potato crop is one of those to which it can be most profitable applied.

When we come to consider the subject of varieties, a volume might be written, and still only a brief outline be given of the origin, history, and comparative merits of the various kinds which, from time to time, have held a place in popular favor. Previous to the appearance of the rot in 1844, a year never to be forgotten by those who remember the wide spread distress which followed the almost total loss of the potato crop, but little attention had been paid to the production of new varieties. English Whites, Pink-eyes, Oxnobles, Merinos, and last, but not least, the exquisitely flavored Mercers, were the standard varieties in my locality. I am not among those who are fond of croaking over the degeneracy of the present time, yet I cannot help feeling that those who have never tasted of the Mercer, as it was in the anti-potato-rot days, have never seen the potato in its perfection. It was no trouble then to raise a bountiful crop, though the same kinds were planted year after year, and the appearance of the crop at digging time, large, bright, and clean, as they rolled out of the then newly cleared land, is still fresh in my remembrance. One incident in connection with these splendid crops, I may be pardoned for relating. It was late in October, in the last year of the administration of George Wolf, as Governor of Pennsylvania. A lad of five years, then, I was in the potato-field admiring the bright hued Merinoes, some of them with as many antlers as an elk, as they were tumbled out of the hill, when a neighbor came along and brought the news that Joseph Ritner was elected Governor. That was my first lesson in the politics of Pennsylvania, and though there may be little connection between politics and potatoes, and though Governors of Pennsylvania have not been wont to figure as small potatoes, yet the name of Governor Ritner has always remained associated in my mind with big potatoes. Wide spread and sweeping as the potato disease was, at its first appearance, it was hoped that the disaster would be temporary, that the following year would prove that the cause which produced it no longer existed, and that the crop could again be grown in its former abundance; but this hope was speedily dispelled. The disease was found to be chronic, and year after year witnessed a return of the well known symptoms. Growers received but a scanty return for their labor and anxiety, and most of the few grown were too immature and watery to be palatable. Conjecture was busy with theories of the disease, and men began to cast about for remedies. Accident or experiment led to the conclusion that newly originated varieties were less liable to be affected than the older sorts, and then the production of new varieties commenced in earnest.

Prominent among experimenters in this direction was Mr. Goodrich, whose name has become a household word among the farmers of America, and to whom belongs the honor of founding a potato family, which has produced the most valuable of all the varieties yet known. His first success was in the production of an early variety, a white potato, named after him, the Early Goodrich, which, for several years, had a wide popularity as an early sort. As an illustration of the different estimate placed upon any variety, in different localities, I mention the fact that this, in my locality, ranked as inferior, being ill-shaped, watery, and altogether unsatisfactory. It was, however, in most localities, regarded as a valuable acquisition, and, for several years, held the foremost place as an early potato. The crowning success of Mr. Goodrich's experiments was the Garnet Chili. In quality, in productiveness, in freedom from disease, and in its adaptability to all localities, it proved superior to any variety at that time grown, and, for many years, it remained the prime favorite throughout a large extent of country, and, even to this day, holds its place with some growers, against all its competitors. It has the added value, moreover, of having been the parent of the Early Rose—the almost universally acknowledged standard of excellence—and of some other sorts of almost equal prominence. The great event in potato culture, of recent years, may be said to have been the production of the Early Rose, which was originated by Mr. Albert Bresee, of Vermont, about 1865. Both it and the Prolific having been grown from the same seed-ball of the Garnet Chili. It has been quite generally grown, wherever potatoes are grown at all, for the last dozen years, and though it has its faults, and many claimants for favor have appeared to compete with it, it has not yet been superseded. So far as quality is concerned, it is the standard by which all other varieties are measured, and to say of any other, that it equals the Early Rose in flavor, is to accord it the highest praise. Its productiveness varies with season and locality, very satisfactory crops being produced under favorable conditions. It must be said of it also, that it has a habit of rotting sometimes, without apparent provocation. Its near relation, the Late Rose, is, in good seasons, one of the most satisfactory varieties grown, having the fine quality of the earlier sort, when fully matured, and yielding largely in excess of the early varieties. The Early Vermont, originated about 1871, by Mr. Woodhouse, of Vermont, was claimed to be a cross between the Garnet Chili and the Jackson White, and to be ten days earlier than the Early Rose. Its appearance indicates a near relationship to the Early Rose, and the only way I have ever been able to distinguish one from the other is by carefully keeping them in separate bins or barrels. In general appearance, habits of growth, and, in short, in all respects they closely resemble each other. When I see it stated that it, or any other new variety, is ten days earlier than the Early Rose, I conclude that it may be so, provided it has about nine days the start at planting time. I think the man who timed the race between these two kinds, and found the claim of the Vermont, to the title of Extra Early, made good by just fifteen minutes, was entirely impartial.

The Early Ohio was first sent out by the extensive seedsman Gregory, of Marblehead, Massachusetts, in 1875. I have grown it the past three years, and find it has many characteristics in common with the Rose and Vermont. Planted side by side with the Rose this season, the yield was a little better, with a much less proportion of small ones. In quality, it may be a trifle off; but it is the quickest cooking, and one of the mealiest sorts I ever saw. The Snowflake, a white variety, originated by Mr. Pringle, also of Vermont, the birthplace of so many valuable kinds of potatoes, has, for several years, been one of the leading candidates for popular favor in the potato line. It is a quick grower, of fine dry quality, when fully matured, and seems to have a faculty of standing a high degree of fertilizing without decay. When planted on poor soil, the yield is unsatisfactory; but when well fed, the large number of tubers it usually sets, nearly all attain a good size, making a heavy yield. The Peerless is still grown extensively, and frequently produces heavy crops; but its strong rank flavor condemns it with all lovers of fine quality in the potato. The Canada Victor is one of the newer varieties, and one of the most productive of any I have tried for several years. Its cooking qualities are good, though not the best, and it will stand more hot water to the square inch without softening, than any other kind I am acquainted with. Of the kinds I have tried and condemned during the past few years, I may mention Jersey Peachblow, Harrison, Peerless, Compton's Surprise, Colebrook, Davis's and Bulkley's Seedlings, Ruby, and Brownell's Beauty. But, as I have before remarked, varieties that fail entirely in one locality, somtimes succeed well in another. For instance, Brownell's Beauty proved an almost total failure with me, while I was informed by Hon. John Hill, of Indiana county, last winter, that he had grown it for several years, and depended upon it as one of his standard varieties. I forbear to extend the list of varieties further, as many of those not mentioned, I have not tried.

In originating new varieties several methods are possible; first, the usual one of planting the seed-balls as found upon almost any variety, and selecting from the numberless sorts those which seem most promising; second, by hybridizing, which is accomplished by fertilizing the blossoms upon one variety with pollen from another, which is claimed to result in the production of crosses, some of them having a resemblance to both parents. The Early Vermont is claimed as an example of the hybrids, and it is not unlikely that accidental crosses frequently occur; lastly, by what is termed sporting, of which the Late Rose is claimed as an example, it being only the Early Rose with a prolonged habit of growth. In conclusion, I would say to potato growers in the selection ef varieties to plant, be guided by the scriptural injunction, " Prove all things, hold fast that what is good." Plant the best varieties you know of, but do not hastily conclude that nothing better is possible. Advertisers who have new kinds to put upon the market, do not always tell the exact truth, still it is better to try some new kinds, and to be sometimes disappointed, than to make no effort for improvement. I have usually made it a rule to try some new sorts every year, and I am satisfied that it has paid me to do so. Considering the advancement which has been made in the past, and believing that greater hings yet are possible, I shall continue to look for the coming potato.

The essay being open for discussion and remarks, Mr. BATTLES, of Erie, said:

I reside in a great potato county. Farmers, probably, raise more potatoes along the Lake shore than in any one section of the United States. It is not uncommon for a farmer to have fifty acres in potatoes. Sometimes it runs up into the hundreds; but it is more usual to find farmers having from ten to twenty acres in this valuable product. Consequently, with us it is a very important crop. During the shipping season it is not an uncommon thing for from ten to twelve car loads to be shipped from our station in a single day. The car loads averaging from three hundred and fifty to four hundred bushels, and they send them all over the United States. On or near the Lake shore the soil is sandy, and they raise very fine potatoes; but in a dry season, like the present, the drought affects the crop considerably. On the next bench south, in the grass region, they have a gravelly soil. There, too, the drought affects the crop, but not so much as in the sand. In a southerly direction comes the clay loam, and this season they have raised much the best crops there, and have not suffered as much as on the sand and the gravel.

The variety most largely raised, until recently, has been the Peachblow. Now they raise most of the Peerless and the Late Rose. One thing is of great importance—that is to know whether to plant cut or whole potatoes. You may go where you will, and you will find them having their own ideas; but why they do as they do, none seem to satisfactorily know. I noticed a discussion before the Farmer's Club of Elmira, but from it my knowledge has not much progressed. I noticed that the farmers there mostly plant whole potatoes, and produce much better potatoes, and larger crops, than they do when they plant cut seed. Now, this is a very important fact, and it ought to be determined, so that the country would know.

T. J. EDGE, Secretary. In answer to the question by Mr. Battles, as to the use of whole and cut seed for planting, I think it is safe to assume that many of the discussions alluded to are caused by the fact that most of the speakers regard the potato as a root proper. It is, in fact, merely an underground stem, and is amenable to the same laws and rules which govern the propagation of such stems above ground. It is evident that, in both cases, it is essential to select good and perfect seed, and this having been done, I do not think, other things being equal, that there will be any difference in the product of the whole and cut seed. It requires very little stretch of the imagination to see in the whole potato a *fac simile* of the twig of a tree, with its terminal and lateral branches and buds. In the end of the potato furthest from its attachment to the parent vine, we find a small but close collection of eyes, which we often style blossom eyes, and which correspond to the terminal bud of the leading branch or twig. Passing from this distinct class of buds towards the other end of the potato, we find other buds which we may regard as the terminal buds of the lateral branches of the twig. Some European authorities have even gone further, and have supposed that these latter buds or eyes are connected by a branch with a central stem in the middle of the potato, in the end of which the blossom eyes are situated, and that any portion of this lateral stem may grow; that it is similar to the lateral twig, and is provided with smaller buds. Nurserymen know that if the whole twig is perfectly healthy and properly ripened, each bud thereon will produce a perfect tree of its kind, and that the continued budding does not have bad effect upon the resulting trees. Apply the same rule to the eyes of the potato, and I think much that has been said against cutting the seed will loose its force. One word further as to the eyes: it has been claimed that the blossom or outer end eyes are much better for planting, and that they will produce a better and more vigorous tuber. If it can be proven that the terminal bud of the main stem of our ideal twig will produce a more healthy and vigorous tree then we may suppose that the blossom eyes will produce superior potatoes—otherwise not.

ADVANTAGES OF DIVERSIFIED AGRICULTURE.

By H. M. ENGLE, *Member from Lancaster.*

When we say advantages, it is not to be infered that diversified agriculture has no disadvantages; but I shall try to prove that the preponderance is strongly in its favor. It is claimed, and acted upon by many, that a lifetime is too short for man to bring many things to perfection; that to do one thing well is about all that he can accomplish. There is, however, abundance of evidence to prove the capacity of man to do more than one thing well. The reason why so many are unable to diversify their occupation is the want of proper application during the early period of life, while both mind and body are most rapidly developing. Thus we find so many in the prime of life with narrow minds or inactive physical bodies, or both, that they can move in one narrow rut only. Their contracted minds prevent them from grasping more than one of the many attractions surrounding them. Of these, there are, alas! too many tillers of the soil. A few proverbs may not be out of place, which have their bearings *pro* and *con*: "One thing well done is better than many poorly done." "Too many irons in the fire will cause some to burn." "Jack of all trades and master of none." On the other hand: "Anything but a tread-mill." "Do not put all your eggs into one basket." "Variety is the spice of life."

In many sections of country, especially new ones, such as our great West, where the pioneers are mostly tillers of the soil, it is scarcely possible to commence with a variety of crops, as they must seek a market abroad for their products; and while the soil is so fertile as to justify the growing of the same crop, in succession, for many years, without replenishing it, and railroads carry his products to distant markets at a mere nominal rate, compared with local freights, the pioneer farmer has no occasion to use more than one string to his bow. He can, therefore, make wheat growing an exclusive business for many years, so also with corn or any other crop that will pay him best; but, as his land becomes exhausted, he will be obliged to replenish it, or resort to rotation, or both, in order to secure more reliable crops; and as consumers multiply, and his land enhances in value, taxes will also advance, hence he must resort to a greater variety of products to supply the home demand. The home market, as a rule, being always best, as the producer has the benefit of the expense involved in shipping greater distances. Market gardening, fruit growing, or dairying, or altogether, may be added to general farming, with profit, wherever a fair home market will justify. By growing a variety, the judicious tiller of the soil will hardly ever fail with some of his crops, for, be the season as it may, it will always be favorable to some crops, while having but one main crop, and that a failure, the farmer is often in a bad plight for a whole year, and not unfrequently for many years. Should even he who having but one main crop not have a failure, prices sometimes rule so low as to make it almost equivalent to a failure; while he who has a variety of crops seldom fails to realize remunerative prices for some of them.

To the farmer who has his choice fruits, vegetables, and dairy products, not only for home consumption, but enough to sell to pay him nicely, it appears folly for his brother farmer to buy these very articles which he might as well have raised himself.

A striking illustration is yet vividly before us with reference to some of the southern States, where, in ante-war times, cotton and tobacco constituted the principal agricultural products. The consequence was exhausted soils and a dependent condition, which was the more keenly felt when the civil war broke out. These same States opened a grand market for the Northwest to pour in its surplus breadstuffs, and provisions which these States might have produced as well by growing less of their staple crops, and by a rational system of agriculture, might at the same time have improved instead of impoverished their soils. This application holds good, not only to smaller communities, but also to individual farmers. The following will show what a man may accomplish: I know a gentleman in the eastern part of this State who owns about one hundred acres of land, which he devotes to regular farming—To quite extensive fruit growing, in which he has few rivals in the State. Market gardening to the amount of thousands of dollars annually. Nursery products to no small extent. His green-houses and floral department are on a large scale. He is also engaged in the dairy business, having a herd of Jersey cows from which he makes butter which commands fancy prices, and at fairs takes first premiums. Being proprietor and general superintendent, he makes every department a grand success, finances included. This gentleman may have been trained to this business in his younger days.

I am well acquainted with another gentleman, who was a tailor by trade, which he followed a number of years, when he dropped the business and started butchering, which he followed until he was thirty-five years old, when he came to a friend on a visit in strawberry season, where (as he afterwards said) he ate his first full mess of strawberries. The fine show of berries on the ground of his friend produced a desire to plant and raise enough for his family, so he ordered plants at once, also some dwarf pear trees, of which he saw a sample on the same grounds. The consequence was, he adandoned butchering by and by, and went whole souled into fruit growing and nursery business, both of which he was almost totally ignorant. He also followed market gardening to some extent, and finally owned a No. 1, herd of Short-horn and Jersey cattle. The following will show his achievements in fifteen to twenty years. He carried on nursery business on a large scale, planted and caused to be planted more fruit trees in southern Pennsylvania, than any other ten men in that section, raised and shipped fruit by the car load, at county, State, and United States fairs he exhibited fruits for which he almost invariable received first premiums. He also made his varied business a success, financially included. In addition to the above he spent much time and money in benevolent enterprises.

He has now partially retired from business, with the ownership of a two hundred acre limestone farm, (unexcelled in his section,) besides other property, sufficient to satisfy any man of reasonable ambition.

If my rambling jottings will be conceeded as correct, let us hope that there are more than two men in Pennsylvania that can make diversified agriculture a success.

EXPERIMENTAL AGRICULTURE—ITS RESULTS AND LESSONS.

By F. A. ALLEN, *Member from Tioga.*

Before we can properly estimate the value of results and lessons in experimental agriculture, we must know something of the conditions and circumstances under which which these experiments have been made. Very few of the so-called experiments are of any value, save, perhaps, to mislead and invalidate all tests. The generally accepted meaning of the term experiment is, the doing of something in a different way from that formerly done. Thus, when a farmer changes his seed, or prepares it in any unusual way, he thinks, no doubt, that he is performing an experiment.

Jones conceives the idea of settling forever the vexed question of the preparation and quantity of seed to be used in raising potatoes. To this end he selects four different plots of ground. He *guesses* that each contains *about* a quarter of an acre. So far as he can remember, these plots have been manured about alike. On the first plot he plants good sized potatoes, uncut; on the second, he takes the same kind of potatoes, and cuts them—separating the seed from the butt, or stem end, and plants; on the third, he selects his smallest potatoes, and plants; on the fourth, he carefully cuts out single, good healthy eyes, and puts two in a hill. The seeding done, Jones is quite certain that he has the egg in process of incubation that, when hatched, will produce the goose that shall ever after lay the "golden egg," and *wonders* that men have lived so many years without meeting this question as *he* has met it.

Time rolls on, and Jones' potatoes roll out, and a fine crop from each field. He and his boys and his neighbors examine the crop. So far as they can discover by looking at them upon the ground, there is no difference. "Boys," says the old man, "pick 'em up, never mind about measuring. Their's no difference. Guess there's about four hundred bushel to the acre. *Mighty* good yield that; but the best of all is that I've settled the potato question. It don't make a bit of difference how you prepare your seed. Just as leave plant *little* potatoes as *big* ones."

Now, so far as Jones and his boys and *some* of his neighbors are concerned, on the question of seeding for potatoes, the "*Go as you please*" plan is at once adopted.

The next year Jones plants small potatoes, and a small patch to single eyes. Tom, his oldest boy, puts in, unbeknown to his father, four hills with good sized, sound potatoes. The weather after planting is remarkably dry. No rain for a long time. In short, it is the "off year" for potatoes. Digging time comes and Jones finds that where he planted small potatoes, he not only *got* small potatoes in return, but a small quantity of them; and that where he planted only single eyes, he found scarcely anything. But in digging, Tom's four hills were reached at length, and it was found that they turned out remarkably. "It seems queer, boys." "Them potatoes must be a new kind." "Shouldn't wonder if they grow'd from potato balls that got mixed among the seed." "Guess we'll call them Jones' seedlings."

Tom thinks it would be far more appropriate to call them "Thomas' seedlings," or "Daddy's folly."

This *second* year with Jones' so-called experiments is rather distracting to him. But he is set all right again in a few days, when Deacon Homespun assures him, that, "Unless potatoes are planted in the full of the moon, you will never get a crop, for I've tired it a hundred times." Jones breathes more freely.

Brown wants to settle the question of fertilizers on corn. So he mixes a bushel each of ashes, lime, plaster, and hen manure, together with a peck of salt, and puts into each hill a handful. The resulting crop is good. His neighbor, who had only unleached ashes, used a like quantity in *his* planting; crop, equally good. Another neighbor turns over, late in the spring, an old pasture, and plants corn without fertilizers; crop, if anything, a *little better.*

Let us examine, for a moment, and see how much has been settled by these different operations. Absolutely nothing. Instead of throwing light upon the subject, it has made the darkness more visible.

Hundreds of similar operations are performed yearly in all the departments of agriculture with the same unsatisfactory and conflicting results. If there is any one thing fully and satisfactorily settled, touching the raising of vegetables, cereals, or the most valuable kinds of stock, and the way of feeding, I have failed to find it. I examine with great care and interest the annual reports and discussions of the "Experimental Farm Club," where the experiments are made under the eye, not only of seeming experts, but before committees appointed to examine all the "holes in the skimmer," and yet there comes from this body, annually, the same uncertain sound.

The great difficulty in the way of reaching definite results, lies in the fact that the most of experimenters are not seeking after truth. They are attempting to demonstrate a theory previously conceived, and are bound to succeed. They are like sectarians in religion, who read the Bible for the sole purpose of sustaining their creed or dogma. If the plain, straight forward text fails to reach the point desired, why bend it until it will. And just so it is with too many of the experiments in agriculture. If I ask men who are in the dairy business, about the kinds of cows best suited to the farmer's use, or what breeds are best for *quantity*, or for quality, at least four breeds are mentioned, and it is wonderful with what zeal each defender of his faith endeavors to make good his statement. The same diversity of opinion exists with regard to the kind of pan used in setting milk, and the kind of food for cattle, and its method of preparation.

The question may naturally arise, then, are not such experiments valueless? Certainly not. Somebody, doubtless gains, it is true, and it often is the case, that the experimenter loses, and arrives at false conclusions; but somebody profits by it. Agitation tends to bring things to the surface. Anything is of value that serves to throw men out of the ruts in which they have been going for years; and when a man's old notions and prejudices are once uprooted, or badly disturbed, he is generally ready to listen, and examine the new, or, in other words, begins to *think.* When our farming population reach this point, then may we look for rapid progress.

To this end we must introduce agricultural studies into our schoool. These studies must form a part and parcel of every-day school life. There is no earthly reason why our boys should not be drilled in the nature and preparation of soils—the culture and growing of cereals and vegetables, the growing of stock, the keeping of farm accounts, and the measuring of fields. One half of the time now devoted to arithmetic, geography, and grammar, if employed in the above named agricultural studies, would not only give us better and more advanced pupils in the *common* school studies, but fit them, in a measure, for the duties of every-day life, and open up to them a new field of thought and investigation. The knowledge derived from these agricultural studies is not only beneficial, but needful to all, I care not what his calling or profession. The generation of farmers arising from those thus trained, would, in some degree, be qualified to experiment in agriculture, and the results and lessons thus obtained be valuable.

There are very few departments of labor where experiments are more difficult, and where so many controlling and modifying elements enter in as that of agriculture. If in working our soils in the growing of crops we could as easily ascertain what is contained therein as we can the amount we have in bank by consulting our books, or how much and what kind of grain we have by an examination of our granary, it would be no difficult matter to determine the kind of fertilizers to be used with certain crops, but old mother earth when interrogated upon this point, exhibits a remarkable degree of reticence. It is only the few, the *very few*, to whom she gives any answer. The elements of plant-food when sought after elude our grasp. Often when a crop has shown a remarkable growth, we can only exclaim "Upon what meat doth this our Cæsar feed that he hath grown so great;" but the answer comes not back.

Among the many elements entering into these experiments, and of which no notice is taken, is that of time. A series of years of observation have settled pretty conclusively in the northern portion of the State, that one year out of three we fail in our apple crop. In the San Joaquin Valley, in California, it required many years of careful noting to settle what are called the "off years" in crops, but it is now pretty generally conceded that while in one portion good crops are grown three years out of five, that in another it is only *two* out of five. A decade is not too long to obtain definite information.

All experiments made on undrained lands or soils not under-drained, can, in no wise, be satisfactory. Wet or dry seasons so change the conditions that nothing valuable can be determined.

The question then arises, how, and under what circumstances, may experiments in agriculture be made, from which valuable results and lessons may be obtained? In answer to this I would say: The experimenter must be a man who is seeking for truth, and who is not prejudiced in favor of any pet theory. He must be a practical scientist, skilled in noting and observing all elements entering into the experiment.

Are experiments under these circumstances likely to be made? It is quite doubtful. If so, they must be made on State experimental farms, or at agricultural colleges, guarded and guided by the wisest and best of men in these departments. Anything less than this is hardly worthy of the name experiment.

Very much may be gained by a series of observations in many of the departments of agriculture, and may serve, in a measure, as a partial substitute for something better. If ten men, whose farms are contiguous, would set apart, say a half acre of land, as far as possible, similar in condition, and grow the same crop, each working out his own method in his own way, both as to culture and seeding, I am quite certain much valuable information might be obtained. These farmers ought each to visit the other's field, at least, two or three times while the crop is growing, and before the seed is put in, and at the time of harvest. Not only the land should be carefully and accurately measured, but the resulting crop. Trials and observations like this may be made in any farming community. They would serve to awaken thought, which would most likely result in action. Again I repeat, anything is good that tends to throw men out of the ruts. I think I may say with truth that in no other vocation are men so bound down to old forms and customs as in that of farming.

The more I examine the farms and farming of the country, the more I am led to believe that statements generally, and even honestly, made with regard to crops, stock, and stock products, are too often mere guesses, and almost wholly valueless as sources of information upon which to base any important calculation. Indeed, so fully am I convinced of this that I have partially ceased to fulfill the requirements of our Secretary, in making monthly statements to his office. The definiteness of these statements made by me are about like the measurement of the would-be carpenter, who, in reporting, said: "The length was just exactly twice the length of the saw and hammer handle, and two inches."

Nine tenths of the farmers do not know the exact amount of land in any of their fields. They, doubtless, know the amount in their farms, for this is set forth in their deeds, with the *additional* information of "thereabouts" or "more or less."

Then, again, when bushels are asked for, it is in terms, "Well, about"—so much. Scarcely ever are exact measurements. One man measures his corn and potatoes in his wagon-box, the contents of which he has never determined. He remembers that, at sometime, he heard somebody say that *his* wagon-box held just sixty bushels. Another man calculates his fields by the very definite measurements of the length of his fence boards. He *guesses* they are twelve, or fourteen, or sixteen feet long.

Experiments in fencing would prove of great value to the farming community. Hundreds of dollars are annually expended in time and material, as well as money, in fencing where no fences are needed. Farmers are so accustomed to *fence in crops*, instead of fencing in cattle, that, did we not know to the contrary, one would be led to conclude that field crops were accustomed to migrate from one point to another, and, perhaps, leave the old farm. It is not alone the loss of time, material, and money in fencing where not needed, but the loss of land occupied by fences, and the occupancy of this land by weeds, elders, and thistles—a sort of pestilential breeding place for noxious weeds and vermin.

"We made this field in this shape, because our fencing timber ran out, so we had to run it catercornered, and it's rather peeked at this end. We wanted to make the sides parallel, but we had to skew it off to suit our stuff," said an old farmer when interrogated on this point. Have our farmers ever investigated or studied the question of loss in having irregular ill-shaped fields, especially those to be plowed? If not, it would pay to *cipher* a little on it. All plowed fields ought not only to be in the form of parellelograms, but to give the longest furrow possible. If our farmers would experiment in this department of their work, great gain would be the result. The proper and profitable division of a man's farm into fields suited to the *kind* of agriculture followed, requires study and much thought. There ought to be men in every county who have made this matter a study, and who have not only experimented, but have facts and figures to give to prove his plans.

In landscape gardening, skilled men in this department are always sought after. Why not in laying out and planning fields? We need to put more *thinking* into farming—*fore* thought. Then our *after* thoughts would be far more pleasant.

Suppose, during the coming winter evenings, our farmers would sit down with their boys, and, with paper and pencil and ruler, experiment in re-dividing the farm, and planning for the coming crops, calculating the cost and the gain. Would it not serve a most excellent purpose? Let each one submit a plan. Then discuss the advantages and disadvantages arising therefrom. One evening of each week during the winter given to this, would greatly intensify farming, and serve not only to identify, but *interest* our boys in farming. They would feel that they were a part and parcel of the concern—an integral factor. Boys would be induced to stay at home evenings, and not " fly the farm," when older. And now allow me to suggest an experiment that all farmers who have boys may make during the coming winter evenings. I am extremely anxious that it should be tried. All the capital you need invest in it is six dollars. It is as follows:

Subscribe at once for "The Practical Farmer;" "The Cultivator and Country Gentleman," and the "American Agriculturalist." The first two are weeklies, costing respectively two dollars, and two dollars and fifty cents, and the other a monthly, costing one dollar and fifty cents. This will use up the cash capital of your six dollars. These periodicals should be read aloud, article by article, and talked over with the boys, *and the mother*, as well as the neighbors, when opportunity presents. These will furnish reading matter of the most interesting and profitable kind for at least four or five evenings of the week. The boys will look for the coming of these periodicals with great anxiety. As spring approaches, not only your minds will be full of the farm and farming, but the whole man will become vitalized, and a new impulse given to the whole family. You will find that by some unconscious workings, the tools of the farm have been re-fitted, and some remodeled; many new things have been made; the old farm has been re-divided, and new fields formed; plans for crops devised; seeds examined; manures protected, and the farm stock looking better than usual. But the best of all will be the fact that you and your boys have never before spent so interesting and profitable winter in all your lives. Every one of the household has been made better, and far more happy. The reserve force thus accumulated will carry you through seed time and harvest, until another winter sets in. Then will you be able to exclaim with King Richard the Third, " Now is the winter of our discontent made glorious summer by this " little experiment.

FARM CROPS—THEIR COMPARATIVE PROFIT AND EXHAUSTIVE EFFECT ON THE SOIL.

By D. H. Foresman, *Member from Lycoming.*

This is a subject of considerable importance to the farmers of this State at this time, from the fact that many of them are turning their attention to other crops, such as tobacco and vegetables, which, it is to be feared, are damaging to their land. The reason given for so doing is that they cannot profitably raise grain. This may be true, but I think in the end they will find it more profitable to raise the crops which though they may not net quite so large a price, will not be so expensive nor will the effect on the land be so damaging. We will endeavor to prove that by exercising proper care and preserving the rotation of crops, the farmer may secure to himself a sure and lasting source of income.

We will take for instance a farm of one hundred and twenty acres of river flats or good limestone land. To ascertain the comparative profit on this land, we must first consider the amount of capital invested and the actual expenses annually arising. Supposing that the farm is in a good state of cultivation at the start, we will value it at one hundred dollars an acre, making the whole farm worth twelve thousand dollars, the amount of capital invested.

Our expenses are: *First*, seven hundred and twenty dollars, the interest on the capital invested; *second*, one hundred dollars for taxes; and *third*, one hundred dollars for fencing and lime, making a total yearly expenditure of nine hundred and twenty dollars.

Having the yearly expense, we will next consider the profit arising from the land. On a farm of this size about thirty acres of corn can be planted every year, this, with good farming, will produce fifty bushels to the acre, or fifteen hundred bushels on the thirty acres, which at fifty cents a bushel would be worth seven hundred and fifty dollars. There can also be thirty acres of oats sown which will produce thirty-five bushels to the acre, or ten hundred and fifty bushels in all, which at thirty cents a bushel will amount to three hundred and fifteen dollars.

The next crop is wheat, of which about forty acres should be sown on a farm of this size, which will produce twenty-five bushels to the acre, or one thousand bushels on forty acreas, which at one dollar a bushel amounts to one thousand dollars. Besides these cereals there can be planted five acres of potatoes which can be taken off in time to sow winter wheat, these will produce at the rate of two hundred bushels to the acre, making in the five acres one thousand bushels, which at forty cents a bushel are worth four hundred dollars. We can also cut twenty bushels of clover seed, which at five dollars a bushel is worth one hundred dollars. Now take these all together we have corn, seven hundred and fifty dollars; oats, three hundred and fifteen dollars; wheat one thousand dollars; potatoes, four hundred dollars; and clover seed, one hundred dollars, making a sum total of two thousand five hundred and sixty-five dollars, the gross proceeds of a farm of one hundred and twenty acres for one year.

In this estimate, no fruit, garden vegetable, &c., have been counted, as the profits accruing from them may be balanced by some small expenses that have been left out.

Having the value of the produce of one year, ($2,565,) we give one half of this to a tenant, and we have remaining the sum of $1,282 50, from this we deduct the $920, annual expenses, and we have remaining $362 50 clear gain.

In making this estimate, I have made full allowance for seed, and have based all my calculations on my experience on my own farm. The prices of the products are the lowest I ever sold for, and as to the average production per acre, I think any farmer will sustain me in saying that it is not too high for a good farm, kept in a good state of cultivation. As to the value of the farm, I may have placed that too low; but, in estimating the products of our farms, we must not count what we paid for them in "war times," when land was high, and we were getting correspondingly high prices for our produce. In my opinion, a man could buy a farm in 1865 at $200 an acre, and pay for it in five years, as easy as he could buy the same farm now at $100 an acre, and pay for it in the same time. In my judgment, there is a comparative profit in the raising of grain, after allowing six per cent. for the money invested, which, every one must admit, is a just allowance, and after paying all necessary expenses, and it is certainly a safe investment for an industrious man.

Having ascertained the profit on a farm of this size, we will next consider the effect on the land. I know it is not expected that I will analyze the soil, and tell what the crops have taken from it, and so I will state, simply, how I keep my land in a good state of cultivation.

The first thing is to plow deep and well, and then work the ground well, and keep it free from weeds, as they take more substance from the ground than the crops themselves. Then land should be limed every sixth year, about forty bushels to the acre, this keeps the ground loose and makes clover grow. Clover should not be taken off the land, but should be plowed under.

On a farm where the amount of grain is raised of which I speak, there will necessarily be a large quantity of hay, straw, and corn-fodder, which should be all made into the best of manure by feeding to cattle. There should be at least fifteen head of cattle fed every winter, so that this hay, straw, and fodder, and also a good deal of coarse grass, pass through the stables, and, in this way, all this coarse material becomes a source of profit, and, applied to the land, materially prevents the exhaustion of the soil. There is no trouble in making in this way enough manure to cover well thirty acres of land, and, in my experience, land treated thus, is apparently just as good after the first crop is taken off, as it was before.

After the grain is taken off, I sow the land with clover and let it rest one year, and then turn the clover down for corn. I can raise two crops of wheat in succession, and the second will be as good as the first; but I think the last crop reduces the land somewhat, and will consequently need some extra fertilizer to keep it up to the standard of good cultivation. It is, therefore, better to avoid what is called "stubbling," as much as possible.

It will be seen that I have not taken into consideration any artificial fertilizers. My reason for this is, that I consider them a sort of luxury, though they may help the growth of the plant at the time, they do not prevent the exhaustion of the soil.

I think that where a farm is managed in the way of which I have spoken there will be no necessity for using fertilizers, but where land is cropped with tobacco, and other plants that make no manure, something will necessarily have to be done to keep up the fertility of the soil, and this is just where a few farmers make a mistake, not being far-sighted enough to look to the effect on the land, they go on raising such crops until the land becomes nearly valueless for farming purposes.

In conclusion, I would say that farmers should weigh this subject carefully, and examine it for themselves, and if they do not find it more profitable in the long run to stick to the products which are suited to the land and climate of this State, I am very much mistaken in my judgment of Pennsylvania.

CHANGES NEEDED IN DAIRYING TO MEET LOW PRICES.

By X. A. WILLARD, *of Herkimer county*, *New York*.

For more than twenty years dairy products have commanded such uniformly good returns, and have yielded such remunerative profits that dairymen feel almost paralized at this year's low prices.

Men who bought land at fictitious values, and are still largely in debt, must feel the pressure of the times as a serious burden, and in many instances, it is to be feared, will not be able to meet their obligations in the future.

We can hardly expect to return again *very soon* to the high rates of the past—at least we cannot expect them to be permanent. We must accept the situation and devise plans for meeting it. If the causes are sought for this depression of the dairy interest, we shall find, in addition to causes affecting trade in general—first, that the large increase, of late, of dairying in Canada, and the West, is forcing more goods upon the English markets than can be readily disposed of in those markets at what we consider good prices. It is true a bad season, and short crops, may for a time enhance prices, but extra rates for a poor yield can give no permanent advantage.

For a long time we have been at fault, in looking so exclusively to England for a cheese market, and in making so little effort to stimulate home consumption. That the consumption of cheese in Britain is immense must be admitted, and it has been generally supposed that England could take all our surplus at good prices, provided we were to supply the desired quality. And although the times are hard in England, prices doubtless would not have fallen quite so low during spring and summer, had not another element of trade been added to compete with cheese. I refer to American meats, which of late, have been exported in large quantities. These meats are furnished so low, compared with English home production of former years, that the consumption of meat is increasing, to the detriment of cheese among those classes of people who can afford but one kind of animal food.

The London quotations of American bacon in August, (1879,) were from twenty-eight to thirty shillings per hundred weight. Our best cheese, at the same time, went at thirty-four to thirty-five shillings, and the next quality at thirty to thirty-two shillings per hundred weight. Here is a difference in cheapness of from three to five shillings per hundred weight in favor of bacon, and so long as meats can be furnished cheaper than cheese, it cannot be expected the laboring classes will substitute cheese for meat. Besides the large trade in American live and dead meats, American and Australian "*Canned meats*," are entering quite extensively into consumption.

Australian mutton in cans is sold in London at five pence per pound. Thus, it will be seen, our live and dead meat trade, which has of late assumed such large proportions, and of which we have been congratulating ourselves, must react in a measure upon cheese, and cheapen it in the English markets. Of course, if drought or other causes cuts short the make of cheese, resulting in a light crop or scarcity, prices will temporarily advance. My assumption is based upon a full average crop, like that of 1878.

That cheese is not eaten more freely than it is by our home population, is due, in a great measure, to the dairymen themselves. We have made great efforts to improve the quality of our goods for the English trade, and nearly all our *best things* are shipped abroad. The poor and inferior cheese is considered by many good enough for home consumption, and so, in a large number of localities, scarcely a pound of really good cheese ever reaches the consumer.

There are dealers who come regularly to the interior cheese markets, always buying low gradesand inferior stuff to supply the trade in towns and villages outside the dairy sections, and even in the heart of the *best dairy districts*, much of the inferior and defective cheese that will not sell on the market, is bartered to the grocers, who offer that or none to their customers. Hence, it comes to be the practice of sending *the best* to foreign markets, and distributing the *poor* among our own people. When we consider that only six pounds of cheese *per capita* would annually sweep away our whole product in home consumption, and leave nothing for export, some idea will he had of the great abuse practiced on the home trade.

The time has come when we must pay more attention to home wants; when mild, rich, nutty flavored goods can be readily had at retail. When good cheese shall be upon the tables of all classes. When dairymen themselves shall set the example by supplying their families, and those in their employ, with nice, rich cheese.

There are hundreds of farmers who only occasionally indulge their families and workmen with cheese, and then it is of the sort "out of flavor," or of the poor white-oak kind; and if anyone remarks the absence of cheese on the table, the head of the family will inform you that "our folks" are not fond of cheese. Such men remind one of the fellow down in Florida, who was asked by a northern man if he ever ate alligator? "W-a-al," he replied, "I kin truly say I hev; but that war a time when alligators war plenty, and table serapins war skurse."

But you will ask him, how are we to meet the situation? How is it possible to produce cheese at six and seven cents, and butter at fifteen to eighteen cents?

The time has been when prices were no better, and yet farmers paid for farms and brought up large families on the profits of the dairy.

In 1828, cheese brought six and one eighth cents in New York city, and it did not reach seven cents for seven years after, or until 1835. Butter, during this period, went at thirteen and one half to fifteen cents in the same market.

In 1841, 1843, and 1844, the New York city quotations for cheese were five and one fourth to five and three fourths cents, and in 1844, it was sold at four and three fourths cents. Butter sold at eight and one half to eleven and one half cents.

From 1845 to 1853, a period of eight years, cheese sold in New York city at five and three fourths to six and three fourths cents, and only in one year, 1846, did reach seven cents. Butter, during the same time, ranged from thirteen to sixteen cents, except in 1852 and 1853, when it sold for eighteen cents per pound.

These prices, you will understand, were not "country prices," but prices in New York city, after paying freights and commissions to the "middle men."

Now, it must be observed that up to 1853, the dairymen of New York had laid the foundation of their wealth. Men bought farms and paid for them by farming, and it was a very unusual thing to hear of farmers going into bankruptcy, unless by endorsing or by some outside speculation.

Contrast the liabilities of farmers then with what they are to-day, and I think you will find there is more debt *now*, that cannot be paid. That it is harder now to "make both ends meet" than then.

We ought to farm better, and make more money *now* than then, because farm machinery has been so perfected that the outlay of muscle and of time, in a large share of work, is vastly reduced.

Many kinds of farm work may be said to be now done by machinery, while the wonderful spread of intelligence and the progress made in every department of science should make it easier now to prosecute work successfully than of old.

We feel the low prices the more acutely because with twenty-five years of unexampled prosperity in dairying, with twenty-five years of extraordinary high values for butter and cheese, this year's rates appear in contrast to be a mere pittance.

With cheese at twenty to twenty-five cents per pound, and butter at forty to fifty cents, dairymen found it easy to get an income from the farm without paying special attention to business, and many farmers of moderate means fell into the habit of taking things easy. They found it more convenient to *buy* such necessities as they required than to raise them on the farm. Easier to hire trained mechanics, at a high wages, to do the simple repairs belonging to the farm than to do it themselves, or with the help of the usual farm hands.

They found it very easy to bring up boys and girls in idleness, with expensive habits—expensive luxuries, that men only of large fortunes indulged in thirty years ago. The simple calico dress of eight yards that was once thought so becoming for every day wear, has been amplified to twenty-five yards in this period, requiring more time to fabricate, with the aid of the sewing machine, than it did then with the hand needle. But no matter how costly the fabric, the trimmings always overmatch the pattern in cost. Prints were never cheaper than now, but of what avail is it when a dress pattern, bought for seventy-five cents, will cost six dollars in the trimmings.

It is a most curious physiological fact that all the youth of this age have "tender feet," requiring French kid shoes, or French calf brogans, at six to twelve dollars per pair. Such things were not imperatively demanded for every day farm work thirty years ago.

But these features of the times need not be referred to further. It remains only to remark that dairying, *at present prices*, cannot pay for many of the luxuries that have been introduced of late on the farms, and it never ought to have paid for *some* of them; because they have educated our young people into extravagant notions, and a distaste for farm work; all of which makes it harder for the youth of these times to meet the necessities of the situation.

There is no desire to underestimate the difficulties that surround the dairymen, or to belittle the heavy pressure caused by low prices. The situation, however, must be accepted and faced manfully.

To meet the present state of affairs, dairying should no longer be carried on as an exclusive business, for it is now necessary to introduce mixed farming more largely than formerly in connection with the dairy. The dairymen must stop buying from abroad that which can be raised on his farm. Instead of depending on the dairy to furnish money to buy grain and feed for his stock, he should raise what is required, and have some little surplus to sell. He should stop buying flour, and go to raising wheat to supply family wants.

The old dairy lands, in many localities, are exceedingly rich, and like virgin soil for the production of grains. Winter wheat, in Herkimer and Montgomery, and the adjoining counties of central New York, has, of late, yielded at the rate of thirty-five to forty bushels and upward per acre. A large number of dairy farms will be benefited by breaking up, and by raising corn, wheat, and other grains on portions of the farm in succession, and, by feeding the coarse fodder, quite as much stock will not unfrequently be kept as under the present system of exclusive dairying.

We must go back again to growing our own stock for the dairy; to fattening farrow cows, or those requiring to be turned off on account of accident, instead of giving them away for a mere song to the drovers. If the drover can make a handsome profit in fattening lean stock for the shambles, why can not the dairyman add that to his own account.

Many dairymen are so situated, that they can keep small flocks of coarse wooled sheep with profit. There is always a good market for early lambs, and mutton, besides the supply of a family with fresh meats from time to time, instead of going to the butcher, is money saved to those who provide for this luxury on the farm. Early lambs all along the valley of the Mohawk, in New York, bring from four to five dollars on the farm, and a sheep, in wool and lambs, will not unfrequently yield from ten to twelve dollars annually. It will pay to veal such calves as are not wanted for the dairy, instead of slaughtering, when three or four days old, and throwing the carcass away.

If we adopt the plan of raising everything on the farm that *can be raised*, to supply home wants—if dairymen will stop buying, and live more within themselves, they will find that dairying, even at the low average prices of this year, can be turned to good account.

The business is not bereft of vitality by any means. We need to practice more economy, to give more thought and time to our work, trusting less to hired help, and then we shall conquer the situation, and again enter upon a season of prosperity.

It is true, extraordinary gains cannot be realized. But yet, the dairyman who attends strictly to his calling, and who manages with due forethought and economy, may be said to be engaged in a comparatively prosperous business, when measured with those who have invested their means in merchandise, in fancy stocks, in bankrupt railroads, in reckless banking with defaulting officers, and in over extended manufacturing interests.

The losses occasioned by unremunerative business in New York and other cities, have been fearfully large, and many persons, who, a few months ago were accounted wealthy, are now stripped of their all, or must begin life anew. Official speculation, and mercantile fraud, has blackened the year, and brought suffering and ruin to thousands.

These disasters are not without their lessons to farmers. We can now see how much more perilous are those occupations in which rapid accumulations are supposed to obtain, as compared with agriculture, which yields its gains slowly, but at the same time more surely promises a competence in old age. And it is well for farmers sometimes to consider these things, and contrast their occupation, in its more quiet and peaceful aspect, as compared with the exacting and stormy life of those engaged in trade, and and the perilous pursuits I have named.

Butter Making

Has been less remunerative than formerly, and our butter dairymen have to encounter the new problem which has sprung up in the trade—that of oleomargarine.

Oleomargarine butter has obtained a footing in the home and foreign markets. Scientific men are constantly at work with a view of improving its flavor and texture, and if a certain class of consumers prefer it (on account of price and quality) to *inferior* butter, you cannot prevent it.

I do not advocate here the manufacture and use of oleomargarine butter. I only desire to speak of it as a new article of food which has beat its way into the markets on its own merits, and stands firmly in the way of the sale of *all inferior butters.*

It can be produced more cheaply than genuine butter, and as the quantity which can be made seems to be unlimited, there cannot be much doubt that it will, in the end, crowd INFERIOR BUTTER TO THE WALL.

The recent introduction of refrigerators upon ocean steamers, opens up a foreign trade for us in *fine butters*, and is an outlet for all surplus make.

During the past year, the best grades of butter have been quoted in the London market at one hundred and fifty shillings sterling, and are now (October) one hundred and forty shillings per hundred weight, and American creamery shipped in refrigerators has advanced to one hundred and thirty-two shillings, and are now (October) one hundred and twenty shillings as an extreme price. At one hundred and thirty shillings, butter would realize about twenty-eight cents, gold, per pound; and at this price it would seem we could afford to export.

I have a letter recently from England, from one of the leading dealers in dairy goods, in which it is stated that oleomargarine butter is largely used, and that it never comes in competition with fine butter, nor are prices of fine goods affected by its sale. The competition, it is stated, is with *inferior butter* of all descriptions, and its sale often tells heavily on American butter of *second grade*, the oleomargarine often being preferred (if fresh,) to this sort, even at the same price. What is needed in the trade is a good shipping package, that will keep butter air-tight during the voyage, and until it reaches consumption. And I am not sure but Mr. Higgins, of Speedville, New York, has accomplished the means of transporting butter without change and loss of flavor, and this is affected as follows: in churning, when the butter assumes the granular form, or is in small particles, the agitation is stopped, the buttermilk drawn off, and the granules washed with cold water and brine, which frees them from all milky and caseous matter. Then, in this granular state, it is immersed in brine in heavily hooped and perfectly air-tight oak casks, headed, and sent to market. He claims that butter thus treated can be sent any distance without change, and will arrive at its destination in the same condition as it was taken from the churn; in other words, in a fresh and aromatic state, and only needs molding into form and salting, so as to meet the tastes of consumers. During the hot weather of August he sent a hundred pound cask to England as a test, and, I am informed by the receiver, that it arrived in perfect condition, and sold at top prices.

The success of the Danes and Sweeds in this matter is worthy of notice. They put up butter for the South American States in sealed cans, and it arrives in good order, selling usually, I am told, at seventy-five cents to one dollar per pound.

This trade is carried on by English merchants, and it is surely a discredit to this country that these markets should be held by countries so remote when they should be occupied exclusively by us.

Winter Dairying.

As a means of further promoting the butter interest of the country, winter dairying, it seems to me, offers advantages that have been generally overlooked by eastern dairymen.

In cool weather milk, when drawn from the cow, is less liable to be injuriously affected than in hot weather, and in all its subsequent manipulations there is less danger from decomposition and injurious taints. In cold weather butter can be easily kept sweet during its transit to market, and while being placed in consumers hands. But in addition to this, nice fresh butter of the finest quality reaching market in the winter, when the great bulk of butter offered is summer and fall make, will be considered as a rarity, and is eagerly sought after by certain class of consumers, who are willing to pay a higher price for it on account of its aroma, freshness, and flavor.

Thus it will be seen a ready market and top prices are secured, which are of great importance to the dairyman.

Leading butter merchants affirm that the winter dairy butter of the West has a deservedly high reputation in market. Commanding not unfrequently from three to five cents and upward per pound above the best sorts from eastern dairies conducted on the old plan.

It is claimed too, by the use of corn-meal, and other ground grains, cows fresh in milk can be made to yield as fine a product of butter in winter, as cows fed on the sweetest pasturage in summer; while the average product for several months in the season, will always be in favor of the winter grain-fed cows. The usual plan of winter dairying, is to have the cows in milk during the fall. The yield of milk is at first abundant, but in spring, as the quantity naturally decreases, the cows are turned upon fresh pastures which starts up the flow again, thus securing a larger yield of milk for the season, than can be obtained when treated on the old plan.

As the hot weather approaches, and when grain begins to depreciate in quality, and "flies are a worry," the cows are dried off, taking their rest preparatory to their coming in milk again in the fall.

It must be evident that under this system, the animal will generally be in good flesh, and in vigorous condition; since being fed liberally on meal during winter, in addition to rations of hay, roots, and other provender, they are not liable to run down thin and poor.

Mr. Boies, of Marengo, Illinois, who may be said to be the originator of this system, and who makes it eminently successful, dries off his cows about the first of July, and has them come in milk in the fall. He says the quality of feed makes a very great difference in the quality and yield of milk.

Mr. Boies feeds liberally—five quarts of meal in the morning to each cow, and a quart of oil meal every day to assist digestion. At five o'clock, P. M., they again get five quarts of corn and oat meal mixed; all this in addition to rations of early cut hay. The cows are milked twice a day. After milking and feeding in the morning, the cows are let out to drink, the water being always *warmed* in winter. Under this system, three hundred pounds of butter are obtained on an average from each cow, which is about one hundred pounds more than the average of good dairies at the East, in summer dairying. At twenty-five cents per pound for butter, this would be a gain of twenty-five dollars per cow, or five hundred dollars per year in a dairy of twenty cows. Of course, the manure from cows so highly fed must be of much more value than that usually obtained on dairy farms, and this item should be carried to the account of profits in winter dairying.

It is not recommended that every dairyman enter upon this system, but rather that such a division be made to insure a free consumption of freshly made butter at all seasons of the year, thus keeping prices at a maximum, and doing away with old stale butter.

The Cream Extractor.

During the past fifteen years the process of extracting cream from milk has been revolutionized, and "the probabilities of to-day" are, that in an hour or two after the milk is drawn from the cow, we can have the cream separated from it, and ready for churning.

What a wonderful array of invention has been brought out of late for cream-raising! and what earnest controversies they have elicited! Starting with the first improvement—the Orange county pail and pool system, and the creameries it originated—we have seen the "large pan apparatus" followed by the Evarts or ice process, and its numerous modifications. And now the centrifuge is likely to supersede all this paraphernalia of tin-ware, ice-water reservoirs, and refrigerator-chests. We advance to the machine by which cream is separated from milk by rapid centrifugal motion.

At the late Royal Show at Kilburn, a machine working on this principle was shown, and took the silver medal.

It was the invention of M. Gustave Laval, of Stockholm, Sweden, and is spoken of by the *London Agricultural Gazette* as the most important novelty that was exhibited at the late Kilbourn show. Its appearance has been likened to a huge top, driven by adjustable friction gear, and whirling at a speed of about eight thousand revolutions per minute. The milk is fed through a tube in the center at the top, and descends to the bottom of the revolving disk, where it is discharged into two branches, and as fast as the cream is separated it is forced upward and out of a tube for the purpose.

The machine on exhibition, holding but ten pints of milk, extracted the cream perfectly from from it, and worked at the rate of thirty gallons of milk per hour. I cannot describe fully this ingenious device; but it will suffice to note its advantages, which are thus summoned up by the *Gazette:*

"*First.* It will do away with the trouble and expense of setting milk in pans. *Second.* Less capital will be required in the erection of butter-dairy houses, as a separator occupies but very little space. *Third.* The cream can be separated as fast as the milk is drawn from the cows, and the cream churned immediately. *Fourth.* It will effect the commencement of a new era in the commerce of fresh cream for our tea, coffee, and strawberries. *Fifth.* It will be the commencement of a new era in the various uses to which sweet-skim milk may be put. The milk comes from the separator sweet and pure, all the animal and other odors detrimental to cheese-making being removed. *Sixth.* It will enhance the intrinsic, as well as the commercial value of whole milk, sweet milk from which the cream has been removed, and the cream itself. *Seventh.* And lastly, it will increase the consumption of and demand for dairy produce."

It may be remarked further, that in an extensive course of experiments, made at the Royal Agricultural College of Awlarp, Sweden, in June last, 1879, the general result was that more butter was made from a given quantity of milk by the centrifugal process than by the ice method of Swartz.

The Milking Machine.

But there is another invention that promises to reduce greatly the labor and expense incident to dairying. I refer to the cow milker which has been so amplified and improved by Mr. Durand, as now to promise success. This machine consists of four cups fitting the teats with valves worked by levers and mechanism so as to exhaust the air, drawing the milk by suction, similar to that of the calf. The machine is worked by crank and balance wheel, and has the capacity of milking twenty-five cows per hour. These machines, it wili be seen, must greatly lessen the cost of managing a dairy, and by so far may be added to the profits of the business.

Fancy Cheese.

Again, some of the cheese factories would have their profits enhanced by turning their milk into Edam, Swiss, or some other kind of European fancy cheese. The Edam, as is well known, is a small round cheese of five or six pounds weight, and is imported into this country and retailed at from twenty to thirty cents per pound. Edams have always had a great sale in England, and are generally quoted above best American. They are worth to-day eighteen shillings sterling above fancy American in London.

If I were to manage a factory and was seeking to get the most money out of my milk, I would put it into Edams, Pine Apple, Stilton, or some other fancy make, for these always bring an extra price as a matter of convenience in handling and as an ornament for the the table.

Then there are those delicious little cream cheeses, the Neufchatel, and Soft-French cheeses, the Fromage Gervais, which should occupy the attention of our dairymen, and enter largely into home consumption.

Waste.

In Europe, Americans are charged with being wasteful. It is said of American travelers abroad, that their foolish extravagance in the use of money, has advanced the cost of living more than forty per cent. in all the capitals and watering places of Europe. The charge is probably not without foundation, and, as a people, when measured by the standard of other nations, we are, in many ways, wasteful and extravagant. We are a nervous people, fond of doing things with a rush, and the old adage "great haste, great waste," is often applicable to many engaged in all kinds of work. There are many wastes and leaks on a farm that can be avoided, and it is the avoidance of these leaks, that not unfrequently marks the prosperous from the unprosperous man.

Dairy farmers have often complained that the business did not pay; that they can scarcely make the ends meet, and they are often charged with extravagance in furnishing their houses, in buying fine apparel and expensive equipages, and thus living beyond their means. These things, doubtless, obtain more largely now than formerly; but the fault is not so much in having these things as in their want of care and waste. There are many articles which, with proper care, will last a lifetime, and, though their first cost may be considerable, if properly cared for, and used for many years, they do not prove so expensive as cheaper articles, that have to be often replaced. I know of farmers who get a new buggy every half a dozen years, and so of all the machinery and tools of the farm, and if these require to be re-placed at short intervals for want of care, of course that farmer adds greatly to his expenses. There is the loss of a thousand little things, each of which taken separately appears to be insignificent, but, when considered in the aggregate, amount to a large sum.

Loss in Selection of Stock.

But one of the greatest leaks in dairy farming is the poor selection of dairy stock. A great many animals do not pay for their keep, and yet they are retained on the farm from year to year to depreciate the farmers income. It makes a great difference whether an animal yields annually five hundred pounds of cheese, or but two hundred and fifty pounds. The latter brings no profit, but entails positive loss.

What would you think of the merchant who deliberately buys goods at prices which he knows cannot be obtained for them; but are not many of us doing the same thing in the keeping of stock which we well know or *ought to know* is every day running us in debt.

All poor milkers—all sickly and weak constituted cows should be annually weeded out of the herd and disposed of, even though it be at what seems, at the time, a sacrifice, for dairying, at present prices, cannot be made to pay, if the poor milkers are allowed to eat up the profits from the good ones.

I might go on enumerating a long list of wastes and leaks, common to many farmers, but I have made sufficient reference to indicate the line of economy, which, it seems to me, the farmers now have imperative necessity for adopting. And I ask you practical dairymen, whether the income of the farm may not be increased in the way I have named, and whether the money thus saved, is not as valuable as the same amount obtained from the sale of your dairy products.

Dairy Fair.

The question of our annual cheese and butter show or dairy fair is attracting attention in the State of New York, and both a State and national show is contemplated. I think every dairy section should inaugurate such a fair of its own, to be held in some central portion of the country easy of access by rail, so that the product from different sections can be delivered and dairymen readily called together.

The amount of practical information, and real benefit to the dairy industry of the country from such a fair cannot be over-estimated. A dairy fair should always be held in connection with a convention of dairymen and manufacturers, where everything in relation to the cheese and butter exhibited should be freely discussed. The faults and excellencies of the samples clearly defined and pointed out. Such fairs ought to attract the most noted experts in the country, men who are constantly handling all classes of dairy goods, who are fully informed in regard to the different markets at home and abroad, and who can point a criticism with a sharpness gathered from profit and loss in dairy goods.

Such is the course of the great dairy shows at France, England, and that held in New York city, and they have been of great advantage to the dairy industry of the country, for a grand gathering of manufacturers and dairy farmers is an important feature, and these, of all men, are the most to be benefited by such an exhibition, and a discussion upon the merits of the exhibits. A dairy fair, as thus outlined, I esteem one of the great needs of the present day, to stimulate us on to further progress in dairy manufactures.

Making Cheese for Export.

The first thing incumbent upon American cheese manufacturers is to study the tastes and wishes of consumers who take our products. No matter if their wants seem unreasonable to us, it is not our province to set up a standard, to dictate what their tastes shall be, but rather to meet the requirements of our customers, who are willing to pay for the service, in money and good wishes.

Now the type of cheese which the Englishman wants, and for which he willing to pay a high price, is the improved Cheddar; and the Sommersetshire dairyman makes it by setting the milk at a low temperature. When the coagulation is perfected, they cut the curds into fine particles, so that all parts may be acted upon by heat alike. They draw the whey early, before acidity is developed, and then heap the curds in the vats so that the acid process may be under complete control. They then press out the whey and afterward grind the curd in a curd-mill, salting at the rate of two pounds of salt to one hundred pounds of curd, then put to press and keep in press two days. They then cure the cheese at a temperature of about seventy degrees, and in an atmosphere sufficiently moist so that all the constituents of the cheese shall have time to assimilate or amalgate together, forming one homogenous mass, smooth, buttery, sweet, nutty in taste, leaving a delicious delicate flavor in the mouth—a morsel fit for the table of an epicure.

Why men will persist in following their own plans and notions in making cheese that sells from twenty to thirty shillings below first-class cheddar, instead of adopting a process that will give true results, passes all comprehension.

I am assuming, you will remember, that the milk is sound when it goes into the maker's hands. For if it is faulty, that is a matter belonging to the producer, and which no art can wholly overcome; because, sooner or later, defects will obtain on this account in the manufactured product. So far as any improvement has been made in the cheese manufacture of the past ten years, it is from a gradual approximation to the cheddar process.

We have tried, in various ways, to cut short one feature after another of the process, but the results have not been satisfactory. One will say he prefers to sour his curds wholly in the whey. He does not believe in grinding the curds—it is too much trouble—he can cure his cheese well enough in variable temperature, according to that of the atmosphere. But mark the result. The cheese from that factory never sold to within ten to twenty shillings sterling the price of fine cheddar in the English market. I do not make this assertion at random. I have watched the English market for the past fourteen years, making weekly reports of sales, and, in all that time, I have never known a single sample of American cheese that was reported to have sold on an equality in price with extra fine cheddar. We are sometimes told—and it is a loop hole of escape to many who think they make a better article than anyone else—we are told, I say, that the difference in price between fine English cheddar and American, is due to prejudice. Prejudice may have had influence many years ago, but it does not obtain to-day. Cheese is now sold in England wholly upon its merits. The people are a cheese eating people, and they are close discriminators of quality, and you cannot coax them to pay extra prices for anything less than extra goods.

Curing of Cheese.

In closing this branch of the subject, I must refer to the very unskillful manner in which American cheese is cured. A neglect in providing curing rooms, where a uniform temperature can be maintained, entails immense losses annually on our cheese product of all grades, because even the poorer sorts could be improved, by proper attention to curing. When cheese is well made from sound whole milk, we have, as it comes from the press, a tough curdy-like mass, consisting of casein, butter, water, and some mineral matter. In this condition, it is about as unfit for food as unbaked dough. To fit it for the palate, and render it digestible, the casein must be broken down and intimately mingled with the butter, while a portion of the water must be eliminated, and the balance so distributed through the mass as to make the whole a homogenous substance, mellow, plastic, delicious to the taste, and digestible.

The moisture must be so intimately mingled through the whole, that it cannot be easily separated or distinguished from the other parts, but rather giving one the impression, when a bit of the cheese is pressed under the finger, or tasted, that it is rich in butter.

In addition, the several parts, while undergoing this change, must have retained a clean, sweet, nutty flavor. When fully cured, the cheese should contain thirty-four per cent. of water, thirty-three per cent. of butter, and say twenty-eight per cent. of casein. Now, it is evident, (unless some regular system be observed in curing,) the changes, which the curd undergoes in fermentation, will be likely to be different from what we desire to have them.

A defect often complained of in American cheese, when well made, is a tendency to dryness, and a deficiency in what the "cheese-mongers" call *stock* or butter. This fault comes from a too rapid evaporation of moisture in the early stages of curing. The water does not have a chance to assimilate with the other constituents before passing off; hence dryness and apparent loss of butter. If the evaporation had been gradual, and time given for the water to become assimilated or fixed, so to speak, in the cheese, the curing process would be carried on more perfectly, and the evaporation, therefore, would of necessity be more slow. Again: if the fermentation is carried on unevenly—at one time hastened by high temperature—the cheese is apt to have a bitter taste. If the cheese is subjected to a very high heat, the fermentation changes, so as to take on putrefaction taints. Immense quantities of this kind of cheese go in upon the market every year, resulting in heavy losses to the producer, and not unfrequently to the dealer also. It is the bad flavor that injures American cheese, both at home and abroad, more than all other causes combined. A cheese may be dry, and lack fat; but if is clean, sweet, and nutty in taste, it can be tolerated on the table; but a stinking putrid lump of food is not only disgusting to the olfactories, but cannot be condusive to health. We shall never be able to produce an uniform quality of cheese of the highest excellence, until the curing process is so regulated as to be under complete control, and where an average temperature of about seventy degress may be maintained.

The most feasible method of regulating the temperature in curing-rooms, it seems to me is the plan invented by Prof. Wilkinson, and known as the sub-earth air duct. In this system the air is conducted along underground where it is cooled to the temperature of the earth, and then flows into the curing-room, which is so constructed with double walls and windows, that an even temperature may be secured during the entire cheese making season.

Conclusion.

In this wonderful age of new ideas, there is a tendency to accept speculative theories and methods without sufficient scrutiny, in the hope of realizing some grand result. I do not object to experiment, to trials, and methods for promoting progress, but we should look closely to their practical results. "Prove all things and hold fast to that which is good," is a Divine injunction which it is well to heed in all our different relations in life.

The great obstacles to human advancement are not the want of a *revelation* and *competent teachers;* but, in the fact, that the great body of the people are always too far behind the intelligence and the inspiration of the age in which they live, and fail to understand the truths which that intelligence and that inspiration present to the public mind and heart. Those dim foreshadowings of a great truth, which are thrown across the shifting scenes of human life to indicate the approach of a new era, and the introduction of mightier agents catch not the eye of the multitude. The masses expect truth to be borne like Minerva, full grown and armed for conquest. Ideas must be molded in brass and iron, and presented in a work day dress to be recognized and adopted by the people. Hence, efforts for human improvement should be directed not so much to extend discovery, not so much to multiply inventions, not so much to seek out new truths, but to introduce among the masses the discoveries and inventions already made, and practical effect to the truths already established.

ABORTION AMONG DAIRY STOCK.*

By ISAIAH MICHENER, V. S.

Having been appointed by the State Board of Agriculture as chairman of a committee to examine and report upon the causes of abortion among cattle, I submit the following brief report:

There are a number of causes for abortion, which have generally been promiscuously thrown together, and which I propose to separate from the specific abortion that we have been particularly called upon to investigate.

1. OR COMMON CAUSE OF ABORTION.—A cow may be in such a plethoric habit of body that diseased actions will arise from it, and the pregnant uterus being the most sensitive organ in the system, and where the most complicated and vital processes are going on, would be the first to suffer. The system, surcharged with the blood and secretions of the various kinds, makes an effort to rid itself of the oppressive load that it has been carrying, and throws it off by abortion.

2. A cow that is very poor, having no more nutrition allowed her than to support her own life, cannot sustain the embryo calf, and in consequence of this, the calf dies and assumes the condition of a foreign body, irritating the nerves of the uterus until muscular contractions are induced sufficient to expel the foetus.

3. Cows abort from having to lie in stalls so short that a portion of their hind parts hangs over the manure channel.

4. Abortion will occur from being chased by horses or dogs.

5. By brutal men or thoughtless boys kicking them in the abdomen, or from injuries by their companions.

6. By jumping on a fence, with their weight resting upon the foetus.

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* By a resolution of the Board, at its annual meeting held January 22, 1879, the President was authorized to appoint a commission to investigate into and report upon the causes of abortion among dairy stock. As members of this commission the President named Isaiah Michener, V. S., of Bucks, Dr. John P. Edge, of Chester, S. W. Comly, Montgomery, and W. P. Magill, of Bucks, to coöperate with the Veterinary Surgeon of the Board. As chairman of this commission, Dr. Michener makes the above report.

7. By eating any vegetable or mineral substance possessing parturient properties; such as the vegetable fungoids or antimonial medicines.

8. THE AGE TO WHICH COWS SHOULD BE PUT TO BREEDING.—All breeds, except the Channel Island, Jerseys, and Guernseys, should be two years old before going to bull, but these breeds are precocious animals, and may go to bull at fifteen months old. There is no doubt that breeding heifers too young has a tendency to produce abortion, because, the system is not fully developed and is not capable of carrying on such an important and vital process as that of supporting the foetus and building up the system at the same time.

The uterus is not enlarged sufficiently to admit of the growth of the embryo calf, hence, there is a greater pressure upon the nerves of that organ than there would be in a fully expanded and well developed uterus.

The above are common causes of abortion, which any one should see and avoid, and they should never be talked about nor thought of in connection with the specific, *infectious*, abortion, further than to know how much influence they may bring to bear in producing the specific type of the disease we are about to investigate.

Specific abortion, which is so wide-spread and injurious to the dairying interests of the country, is, first, spontaneously generated in the brain and nervous system, and, second, from external, abnormal impressions made thereon. The cause, then, of a case of primary abortion, of this specific kind, is due to an over-excited and irritable condition of the uterine nerves, which may, and often do, become so excited that they produce such a sudden and violent contraction of the uterus that abortion will take place in a few hours without having given us any indications thereof, except this peculiar irritability of the nervous system.

This condition of the uterus may be produced either by an undue amount of, or an unequal distribution of, nervous influence upon that organ, the same as cramp is occasioned in external muscles.

Now, if those conditions of the nerves and muscles of the uterus takes place, (which I maintain they do,) it must of necessity expel the calf. In a case like this, the expulsion would be brought about very soon, without any premonitory sypmtoms, except the excitation of the brain and nerves. In support of the above theory, I will quote some facts from a close observer and valued correspondent, Thomas M. Harvey, who says: "In early times, an old common cow aborted, and we thought had passed her placenta, but it was not so. She carried it several days, and at last dropped it in the meadow with the herd of cows. A *nervous* imported Jersey chanced along, and close by this placenta dropped her calf."

Another case, given by E. F. Bowdic, of Farmingham, Mass. He kept a hospital barn one quarter of a mile away for sick animals. An old, lame, pregnant cow was an occupant of a close box-stall, and from her position could not see others that might come in. A heifer aborted in the home herd, was sent to the hospital barn. When she was fairly in, the old cow, smelling her, began to bellow like a bull, and in two hours slunk her calf. There are cases on record of whole herds slinking their calves after having been terrified by an unusually violent thunder-storm.

Mares are frequently known to abort their colts from inhaling fresh blood, and the smell of a butcher-shop, and also from the stench of a skunk killed in the barn.

These facts go to prove the theory and pathological condition of the nervous system that I have attempted to describe, which results in the most rapid and severe form of disease. But were this abnormal, nervous influence is less severely felt, or is milder in its attack, it would at first produce nothing more than irritation, which would gradually produce congestion of those sensitive parts, then reaction and inflammation sufficient to produce this abnormal result.

We must bear in mind that during the period of gestation the uterus is highly sensitive, and any impression made upon the brain and nervous system will be more than likely to be telegraphed to that organ, and make its impression there. If the impression made upon the brain is of a frightful or disgusting character, either to the sense of sight or smell, it will have an injurious effect, from which abortion may follow. You will always see a herd of cattle excited and distressed at the sight of an aborted calf in their midst, (and so is the aborter herself.) On the other hand, where the embryo remains its full time, the whole herd seems to enjoy it, from an instinct in their nature that all is right.

Let there be one case of spontaneous abortion in a herd, and then by a law of sympathy, or infection rather, the disease will spread, no matter if they are kept from contact with the diseased ones, but kept in the same barn, or where the air becomes filled with the odor of the diseased ones, they abort as frequently and certainly as if they had been in contact with them; which proves that the disease, after once started, is continued and spread by infection.

SYMPTOMS OF ABORTION.—In a severecase of spontaneous, or in the second case of sudden and violent impressions made upon the nervous system, there will be no symptoms to warn us of danger, except an irritable, nervous condition, and that scarcely perceptible to any one, unless he is a very close observer, and acquainted with physiology, or else a veterinary expert.

In the second or milder attack, or where the animals are less liable to those morbific influences, the first symptoms most likely to attract attention are an enlargement of the vulva. The next or simultaneous with the first, filling of the udder, then a falling in of the muscles on each side of the bones of the sacrum.

When the cow does not abort for some days after the symptoms make their appearance, the udder becomes much inflamed and painful to the touch, it is a good index of the condition of the uterus at that time.

Heifers pregnant at fifteen to eighteen months old are more prone to abort, when subjected to these specific influences, than older cows are. When the cow aborts in the seventh, eighth, or early part of the ninth month, the calf is alive and normal in every respect, except being nervous and distressed, which it shows by bawling continually.

Milking cows up to the time of calving has nothing to do with specific abortion, or any other form of abortion, provided the cow is properly fed, so as to maintain her in a healthy condition. The bull has no influence in producing or preventing abortion, no matter how young or how old, provided he is healthy and capable of planting a sound germ.

A large or small milker has nothing to do with abortion, provided always, that a healthy condition is maintained, the cow kept in a fair condition, neither plethoric nor poor. When abortion gets into a herd of cows it increases in frequency and violence from two to three years, mostly at its height the second year. After the third year, the cow seems to become proof against the disease, and will carry her calf up to full time, as if she had never been an aborter. But if the cow is not a thoroughbred and valuable one, she had better be fatted and killed as soon as possible after aborting, and a sound one put in her place, as she will fall fifty per cent. below what she would have done had she not aborted.

Abortion never exists as an epizootic, but springs up spontaneously in an over-excited, nervous animal, and is then spread by infection.

Means of Prevention.—Avoid breeding from cows whose nervous system predominates over the other temperaments. See to it that all the common causes first mentioned are avoided. If any cow in a herd shows the least sign of aborting, remove her immediately entirely out of sight and smell of the other cows, and any person taking care of the aborter must be careful not to carry any of the diseased effluvia to the well ones. Any discharge or placenta dropped upon the straw or ground should be removed, and the place of deposit covered with plenty of dry earth. The aborter should be kept out of sight or smell of the well cows. She must have an injection, per vagina, twice a day for three days after aborting, of carbolic acid, one drachm; glycerine, two drachms; water, sixteen ounces. Mix the glycerine and acid together well, then add the water, and shake well before using. If the abortion occurs in the stable, it should be sprinkled with a weak solution of carbolic acid, one ounce to two gallons of water.

Medicines, as Prophylactics.—Bearing in mind that the nervous system is in a state of excitement, such medicines should be given as are known to quiet the nerves—such as scutellaria, asafœtida, laudanum—these to be given for the irritable condition of the nerves, which produce spontaneous abortion, given in doses sufficiently large to have a sedative effect upon the nerves.

But for cases arising from infection, in which the *materies morbi* has to be taken into the circulation, and touching upon nerve centers as it is carried along, irritating them—in *that* way the effect will not be with electric rapidity that it is when made directly upon the brain and telegraphed to the uterus.

The following medicines will now be indicated: A cathartic, then tinct. aconite, frequently repeated for two or three days; then tinct. belladonna, four times a day for three or four days. If the system is in a plethoric condition, and the fever runs high, with bag and vulva enlarged and inflamed, bleeding, followed by a free use of potassa nitras between the doses of aconite and belladonna. At the same time, a sheet wet with cool water should be wrapped around the abdomen, covered with a dry blanket, and renewed three times a day.

Facts given in this paper I have observed among my own cattle and others, together with similar facts from different correspondents, I have endeavored to make the basis for logical reasoning which corresponds with the laws of physiology and pathology, that may throw some light upon this dark subject, and enlist some one more competent than myself to investigate it.

INDIGENOUS TEXTILES.*

By Prof. E. Lefranc, *of Philadelphia.*

Not less than twelve varieties of indigenous plants may be utilized as sources of fiber of which the leading and most easily available are: *Abutilon*, commonly called Indian mallow or American jute; *Althea-hibicus*, commonly called marsh mallow; *Yukka*, commonly called bear grass or dagger; *Asclepiæ*, commonly called wild cotton; *Ramie*, commonly called China grass.

These plants, besides flax and hemp, are principally deserving notice and description. *Abutilon avicennæ* is the plant frequently seen in corn and potato fields to the annoyance of the farmer, who calls it angrily "devil's plant." The milder name given to it is *velvet leaf*, on account of the smoothness of its leaf, which resembles, in shape, the mulberry leaf.

It grows in tufts and bushes from the fact, that the seed being heavy always falls and grow on a limited spot. In good loamy soil it reaches the height of eight feet, but the average growth in general is of six feet. The bark contains the fiber in its whole length like hemp. The yield of lint is from twenty to twenty-five per cent. of the lignous body weight.

Being properly treated, the fiber is of a quality classed between Sisal and Italian hemp. It has the clear color of the first with the tensility of the second, and is apt to various applications: Fine cordage, carpet filling, mattings, &c. It takes readily any colors from aniline base, and can be disintegrated as fine as the Indian jute—to which it is far superior for strength and dyeing.

Planted broad-cast, at four inches apart, in rich soil, it can yield from four to five tons per acre in stalks. These stalks are worth presently eight dollars per ton.

The great difficulty in the way of farmers, regarding this new product, would be in disentegrating the filament. A special process has been invented for the purpose, but as it would require too much money and technical knowledge to handle it. A central factory will buy the plant by the tons, and simplified the task of the producer; any other individual systems would not work.

Althea hibicus is another plant of similar character, being from the same tribe of Malvacea. It grows in swampy lands and yields and excellent fiber, The average heigth is about five feet. Being transplanted from the roots, which seems to live externally, these perennial plants can be cultivated in rich soil, somewhat low and moist. It would bring about the same price per ton as the Abutilon. This Althea is in reality a cotton plant without fruit. It is the direct parent of the staple shrub, which has also a good

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***This essay was prepared at the special request of the Board as an initiatory step in the introduction of new sources of profit to the farmers of the State, and the Secretary very much regrets the defects of law which compel him to reduce more than five hundred pages of available and interesting matter into a compass of two hundred and seventy-five pages; by this reduction this essay is deprived of many interesting facts, and is, no doubt, much injured thereby, for which the Secretary of the Board and not the author must be held responsible. It is offered to the readers of this report in the belief and knowledge of the fact that to cause the introduction of such products a clear profit must first be demonstrated.**

fiber in its bark. The cotton States could easily find in the stems of their cotton crop the necessary fiber to make all the bagging they use to bail it, instead of the imported jute cuttings from which this bagging is generally made.

A recent experiment on cotton stalks, sent from Alabama, conclusively proved that fact. It demonstrated, moreover, that this filament is susceptible of uses finer than bailing. It is fine, lustrous, light, and bleaches well enough for a wearing fabric. So is the Althea fiber from our swamps.

The extraction of the fiber from the lignous body, which, by the way, makes good paper pulp, must be done by a chemical process recently discovered and applicable, at a cheap cost, to a fibrous plants. Chemistry will, no doubt, supercede ultimately the imperfect process of retting, which is so detrimental to the product.

Yukka is a plant growing in tufts in various parts of this section, especially in sandy regions. It is called Spanish dagger, and bear grass from its pointed appearance. Though belonging to the various and semi-tropical tribe of the *Agava*, it resists to the severity of northern winter, and seems to be a hardy indigeneous plant for all climates. While it grows in Jersey and Pennsylvania, it can be found thriving also in Virginia and Florida. Cultivation would, do doubt, improve it in quality and size. It yields an abundant per centage of fiber, since it is so fleshy and and not woody like the other above mentioned plant. Resembling manilla for strength and quality, except for length, it is applicable to cordage principally.

Asclapiæ is another wild, fibrous plant soliciting utilization. It is called milk weed on account of its milky ejection when broken. The cells contain an india rubber substance in liquid, which accounts for the appelation of "milk weed," given commonly to the plant. The pod furnishes with the seed a fine, silky staple of over one and a half inch long, and the bark bears a soft, white fiber of some value. This silky fur, resembling to that of thistle, is coated with so much of silica, that it could not be utilized in fabrics without a dissolving treatment. It is too slippery for spinning in its native state.

Several varieties of *Asclapiæs* thrive in this section, especially in arid sandy soils. New Jersey has a good share of that indigeneous growth, the utility of which is still latent, as that of many other plants on this continent. Of coarse, it cannot be expected that prosperous industries will be rapidly established out of these erratic products of the wilderness. No individual efforts will succeed in isolated pursuits of the kind. There must be some incentive of a sure compensation created by a superior power. The plants being scientifically recognized as useful and commercially utilizable, let bounties be offered for the largest production of it, and in same time for the best contrivance transforming it into an article of commerce.

Presently the obnoxious weed will become a new factor of trade and wealth for the people. Such was the case with beets when discovered as being a sacharine recipient in nature.

European countries would readily seize in that way these wild elements of new values, if they had any; but outside of the *Alpha textile*, recently developed in Algeria, they have no space left for new material classes of plants. America is manifestly the great coming source of such products.

Ramie, (Urticea,) this valuable fibrous plant is not indigeneous, but will soon become a member of the family.

Introduced in New Jersey after the centennial, it proved to be there at home as well as in southern latitudes. In fact, being protected against severties of winters, this perennial seems to have more vigor in this climate than in warmer regions. It derives its vitality from atmospheric elements more than from the soil, and prospers best in air abundantly oscigeneated with a mild temperature. It is the most prolific growth of the textile tribes. Once rooted in fair, sandy soil, its shoots produce at the rate of one hundred for one planted each season, and furnish three crops of stalks measuring from four to five feet each, and averaging a development of twelve to fifteen feet in six months, without impoverishing the land more than any other plant. The Ramie fiber is a vegetable silk. It has all the fineness, gloss, and almost the tensility of the cocoons filaments.

Its history is ancient and interesting. Its valued use has been known in eastern countries before the Christian era.

Romans brought brilliant cloth made from it in Asia; China, Japan, Assam, Java produce, and wear it from times immemorial. It is applied to the coarsest as well as to the finest fabrics. Those countries exhibited a variety of this product at the centennial and at the Paris exposition.

Europeans have attempted for years to conquer this curious plant and its valuable industries through vicissitudes of an interesting character. It makes up a legend starting from the Soudan; the oldest country, to reach America, the youngest, where it will probably find the last station as all things originating from the east gravitate towards the west.

This legend can be summarized in a few lines:

At the opening of this century, French missionaries reported from China about the value of Ramie called then Tchou-ma or centennial hemp, because it lives one hundred years.

In 1840 a sceintific exploration by the French frigatte Favorite brought it in specimen roots to the *Jardin des Plantes*, Paris.

In 1851 the British Government and private manufacturers exhibited it, with various fabrics made from it, on a small scale.

In 1862 it was experimented with as a substitute for cotton in France and for silk in England.

From that date English traders have monopolized the limited quantity China can furnish, and British Government of India has introduced it in the cultivation of a western province of Hindoostan.

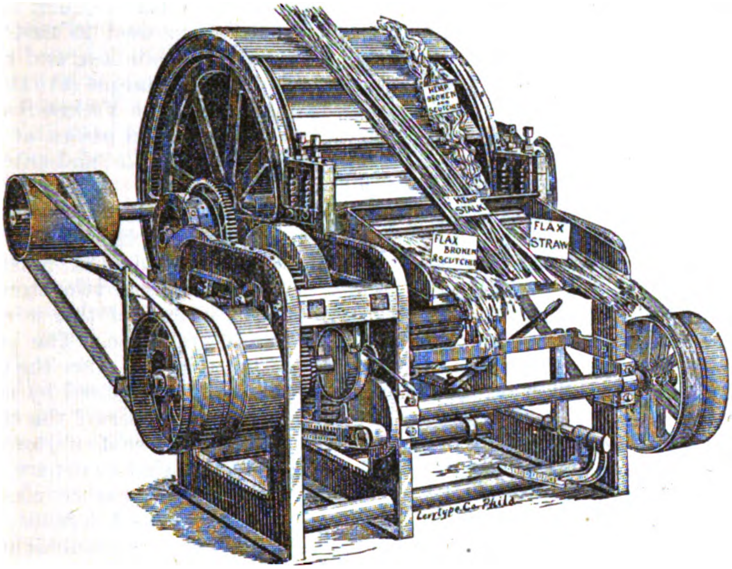
But here the problem of a cheap and proper decortication of the fiber has brought a check on the enterprise. The Chinese peel off the bark and scrape it by hands with a dexterity and cheapness against which Indians cannot compete.

The Indian Government has offered a reward for the best contrivance that will solve the problem in its favor.

Great efforts have been made all over the mechanical world in that direction. Scientists and machinists have been bent over the subject for a good while, but as the invention must be brought into East India at the expense of the inventor, the task is not attractive, especially with the prospect of abandoning for a comparative small profit a valuable solution which can find a better market at home, since the plant grows almost anywhere as well as in India.

It is the case in America. The Ramie plant introduced few years ago in Louisiana, has gone through some experimental vissiutudes and finally drifted to New Jersey, where a regular field is open for it. There is a method working it satisfactorily for the trade, since a market is open for the raw stalk at the rate of ten dollars per ton. Various products made from the plant have carried the New Jersey State premium of one hundred dollars at the Waverly fair, and are now under the investigation of the New York American Institute for the competition of the highest premium as a new product of a ready commercial development. The probabilities are that before long Ramie will be produced in America with such abundance that instead of importing it from China and India, Europe will be too glad to get it from the new world.

As the other textile plants above referred to, Ramie cannot be successfully treated by the ordinary methods of retting, breading, and heckling. Its filamentous texture is of such a nature that a combined action of chemistry and machinery can only treat it in its proper and desirable condition. For the Chinese method of scraping by hand, Ramie is imperfectly prepared.



Improved Machine for Utilizing Textile Fibers.

Manufacturers have to submit it to disintegrations, very often unsuccessfully and always costly. Thence the drawback which checks a more general use of the staple. But the American method mentioned above is radical and complete. It delivers the fiber ready for spining, and in any degree required. As there is here no object for introducing or selling, a description of the process is useless. The only interesting point for growers that they can sell remuneratively the stalks in bundles like straw, hay, &c.

THE AGRICULTURAL HISTORY OF CUMBERLAND COUNTY.

By Hon. **Fredk. Watts**, *of Carlisle.*

This county is a part of that valley which extends from the Delaware river entirely through Pennsylvania, crossing the Susquehanna at Harrisburg, the Potomac at Harper's Ferry, the James river above Lynchburg, and continuing, looses itself in Alabama and the Southwest. That part of this great valley, which is included within the county of Cumberland, is about thirty-eight miles in length from the Susquehanna, and maintains a general average width of twelve miles. It lies between the two chains of the Appalachian range, known as the Kittatinny and South mountains, which have an average height of about eight hundred feet above the common level of the valley. The Conadoguinnett creek passes from west to east at an average distance of three miles from the Kittatinny mountain, and runs at that general parallel through the entire county, and discharges into the Susquehanna river about two miles above Harrisburg. The Yellow-Breeches has its rise near the western boundary of the county, and passes at a general parallel of about three miles from the South mountain, and enters the Susquehanna river about three miles below Harrisburg. All that part of the county which lies south of the Yellow-Breeches creek and along South mountain is sand or gravel land, covered originally with pine timber. That which lies north of the Conadoguinnett creek and along the Kittatinny mountain is slate land; and that which lies between these two streams is limestone land. Thus the general character of the land of this county is one fourth slate, one fourth gravel, and one half limestone. The present population of the county is about forty-three thousand, and since the census of 1870, has lost about as much by emigration as it has gained by natural increase. Carlisle is situated near the geographical center of the county, having a population of about eight thousand, and is the seat of justice.

Although it was not until the 11th October, 1732, that that part of the State, now embraced within the county of Cumberland, was ceded by the Indians to John, Thomas, and Richard Penn, yet, by their tolerance, settlements were actually commenced as early as 1726, but no considerable number of settlers came in until 1732, when a number arrived and took possession of the land. These were then designated as Scotch-Irish, and they were soon followed by many others of the same character of immigrants, for the natural richness of the land, the abundant supply of water and timber were powerful attractions to immigrants from the old country. And forty years afterwards this was the class of people which characterized the settlement of what became Cumberland county, which was legally organized by the action of Governor Hamilton in 1750, and then included all that portion of the State west of the Susquehanna river. As settlements progressed, county after county was lopped off from it until it was finally reduced to its present boundaries by the act of Assembly of 1820, which organized the county of Perry. It cannot be truly said at this day, that the population of the county is characterized by the original settlers of Scotch-Irish descent. They have gradually lost this marked characteristic by the introduction of that large German element which originally populated the counties of Lancaster, Bucks, and York.

The Cumberland Valley railroad, one of the best and most complete roads in the State, passes through the center of the county, from its eastern boundary, at Harrisburg, to its western boundary at Shippensburg; passing through all the principal towns of the county—Mechanicsburg, Carlisle, the county seat, Newville, and Shippensburg. By this avenue is carried eastward all the agricultural productions which go to Philadelphia, Baltimore, and New York, and also large quantities of iron ore and iron made in the valley, and westward all the coal, lumber, and merchandise which supplies the dense population, as well of this county as those which lie west of it. Latteral roads, also, bring from the southern part of the valley, at various points, the products of agriculture and iron mines to the main road.

The surface of this county, whether of the limestone, slate, or gravel land, is everywhere undulating, and produces upon almost any farm either a natural spring or a rivulet flowing from it. There is very little woodland, and it may be safely said that nine tenths of the county, within the valley proper, is under fences, highly improved, with good houses and barns.

Cumberland may be truly called an agricultural county. The farms are well stocked with cattle, and supplied with all the improved implements of the present age. The horses are of the largest and best kind, adapted to the purposes for which they are used; little regard having been bestowed upon that purity of blood, which seems to be so desirable in the roadster or carriage horse. The same remark may be made of horned cattle. They are of what are denominated the mixed breed, showing the characteristics of the short-horned Durham or the Devon. The hogs are generally of a good quality, having within a few years been greatly improved by the introduction of the Chester White and the Berkshire breeds.

It is doubtless true that everything which pertains to the occupation of the farmer, has been greatly changed and much improved within the last twenty years. Farmers, dependent wholly upon the results of their labor, cannot afford to make expensive experiments, hence they hesitate and await the result of the experience of the more hazardous. And here, as in almost every other county of the State, is occasionally found the fancy farmer, who is not so entirely dependent upon the products of his farm, as that he may not occasionally draw upon his bank stock to enable him to gratify his enterprise, and pride, too, by teaching a lesson of improvement to his more cautious neighbors. This is the value of that class of farmers to the community, and they will, and should be highly appreciated by those who profit by their experience, without the risk of loss.

Wheat, rye, corn, oats, grass, and clover seed are the staple products of the county, and whilst fall barley is occasionally and profitably raised, it is not in such quantities as that it may be enumerated as a staple. Rye, too, is sparingly raised, especially on the limestone land, and then only for the purpose of furnishing long straw, wherewith to tie up corn-fodder in the fall. Grass, corn, oats, wheat, and again grass is the usual rotation of crop, and very seldom is the land allowed to lie fallow after corn, and the custom is almost universal of putting all manure upon the oats stubble preparatory to the wheat crop which follows it. Some inroad, however, has been successfully made upon this custom by the fancy farmer, who suggests the propriety of putting all his manure upon the grass stubble, preparatory to putting it down in the fall for corn planting in the spring following, to be followed by very shallow plowing for oats, that the manure may be left undisturbed until the deep plowing for wheat mixes it thoroughly with the ground after it has become a fit food for the delicate wheat plant, time having now divested it of all the deliterious vermin which is found in the manure when it is first hauled from the barn-yard.

The custom is almost universal of cutting off the corn close to the ground, and shocking it until the grain is thoroughly dry, when it is husked and hauled to the crib, and the fodder to be stacked near to the barn-yard, where it is fed to cattle, and converted into manure. This may be said to be the only product of the farm which is stacked out. The barns are generally so capacious as to hold all else, and if there be any lack of room the oats is stacked.

The kinds of wheat sown are as various as the tastes and experiences of the farmer dictate. Names have ceased to accurately designate the species of wheat, except in the immediate neighborhood in which they are grown.

Red and white, bearded and smooth, are the only descriptions which really convey any accurate idea of the qualities sown, and all these are used here; but the red more generally, because of the impression that prevails that it is less subject to the casualties of mildew, fly, and the severity of the winter season. It is all sown with the drill, cut by horse-power reapers, and threshed by separators often propelled by horses, and the steam power is much used for that purpose. This power is generally owned by individuals, who go from farm to farm and thresh the grain for an agreed price, varying from three to five cents per bushel for wheat and oats. Hay is a very large and important crop. It is composed of mixed clover and timothy, cut by machinery, and generally put into the barn, where it is consumed by the stock. Whilst there is some hay sold for the supply of towns, there is but little packed and sent abroad. The judgment of the farmer is opposed to the use of hay otherwise than upon the farm, experience teaching that it is far more profitable to consume it on the farm than to send it abroad at any price.

There are very few sheep raised or kept in this county, although the pasturage along the farms which lie at the foot of the mountain, on either side of the valley, is well adapted to their maintenance and the production of wool. But it has not been the political policy of our representatives in the Legislature to deprive the poor mountaineer of his one, two, three, or more dogs, profitably used for hunting purposes, (for he has no property of any kind to be protected,) by taxing them out of existence; although their indulgence in idleness deprives the farmer of this profitable use of his farm.

There is little stock raised for feeding purposes in this county, although there is much fed for the eastern markets. This is brought from the West, purchased in the fall, fed with hay, corn, and oats during the winter, and sold in the months of March, April, and May. The farmer finds that the increase of weight and price of cattle fed is the most profitable mode of disposing of his corn and oats and increasing the quality and quantity of his manure. No use is ever made here of merchantile manures.

The plow used on either side of the valley is almost universally one of the endless variety of the cast iron patterns, whilst those used in the limestone lands are as universally one of the various patterns of the wrought iron shear and Coulter plows. None other is strong enough to endure the stiff soil and occasional limestone rock which crops out upon the immediate surface.

Whilst all farmers raise potatoes in quantities equal to their own wants and to supply all the home markets, few or none are sent abroad. And the kinds planted are as various as the improvements which are made from year to year in places favored with a soil better and more naturally adapted to the production of this indispensible esculent.

Tobacco has never heretofore been to any extent one of the products of this county, but the signs of the present time seem to indicate that this is not to be the case hereafter, preparations having been largely made the present season to commence the culture of this plant. The few experiences of the past year prove that the soil is well adapted to its profitable cultivation.

There is much clover seed raised in the county since the introduction of the machine for hulling it. All farmers raise, at least, sufficient for their own use, and many are enabled to sell from ten to fifty bushels, which is carried to the cities for sale and export.

The two creeks, which pass through the county on either side, furnish abundant water power for propelling machinery, and which is generally applied to flouring-mills, of which there are upwards of fifty in the county. These are not now as profitable as they were in olden times, before the construction of the railroads, which now carry the grain in bulk to the eastern cities.

Whilst all kinds of fruit common to this climate are grown in this county, the apple is the most important. This, so far as concerns the tree, grows most successfully, but the fruit is a very precarious production. The winter so lingers into spring that, in its first few warm days, the blossom is produced, to be blasted by a succeeding frost. Whenever the season is propitious, the crop is abundant of almost all the species of the apple. The peach is often subjected to the same casualty which happens to the apples. The grape grows abundantly and luxuriantly, and of all the best qualities which are produced in the open air. All the smaller fruits, such as strawberries, raspberries, gooseberries, and currants, are cultivated most successfully, and have shown a most wonderful improvement in their size and quality at the hand of the skillful horticulturalist.

THE AGRICULTURE OF LEHIGH COUNTY.

By J. P. Barnes, *Member from Lehigh.*

To present to the State Board a statement of the past and present condition of agriculture in the county of Lehigh has been assigned to me. I enter on the performance of this duty animated with hope rather than faith in the success of my effort. Where, as here, there has been manifest growth and improvement, the duty of tracing it from its earlier to its later stage is not only pleasant but profitable.

Lehigh county is situated in the eastern part of the State, Northampton being the only county between it and the State of New Jersey.

Its earlier history is embraced in that of Bucks, and latterly Northampton county, from the latter of which it was separated by virtue of an act of Assembly of Pennsylvania approved March 6, 1812.

It is bounded on the north and west by the Kittatinny or Blue mountains, separating it from Schuylkill and Carbon counties; north-east, by Northampton; south-east, by Bucks; and south-west, by Montgomery and Berks counties, and contains about three hundred and forty-one and fifteen hundredths square miles, or about two hundred and eighteen thousand three hundred and thirty-six acres, in area.

The physical appearance of this little county is very diversified. No portion of it is flat, though generally what, by comparison with its northern adjoiners, would be called level. In many places rolling, and in others somewhat broken.

The area included in it is well watered, and all the streams that flow through it are rapid from source to mouth.

Such a thing as a swamp or stagnant stream cannot be found within its borders. It is, therefore, entirely healthy; malaria, with its fearful consequences, being almost unknown. The population of the county in 1820, was seventeen thousand one hundred seventy-five (17,175), at the last census, in 1870, the number of inhabitants was fifty-six thousand seven hundred and ninety-six (56,796), showing an increase, in fifty years, of over thirty-nine thousand souls.

By standing on the summit of the South mountain, near Allentown, where the United States government coast survey have erected an observatory, the eye can sweep almost over the whole country, which to-day is in almost all its parts dotted with flourishing towns and villages, or covered with farms that are now cultivated and beautiful as gardens.

The peculiarity of the county is this, that with a soil second to none in all the State, there appears to be no limit to its mineral wealth. Iron ore of almost every kind; zinc ore of the richest quality, from which millions of dollars have already been made; limestone in abundance in the center and southern parts; inexhaustible bodies of slate in the northern parts; manganese on the southern hills; mineral paint in the eastern part; large bodies of kaoline of a fine pure nature, and extensive cementitious stone quarries from which Hydraulic and Portland cement are manufactured of the best quality, to the extent of sixty-five thousand (65,000) barrels yearly.

Looking at the county now, and remembering what it was about the time of its formation, the progress its people have made in agriculture, and the arts, is truly remarkable. Originally settled by Germans, to whom, in its wisdom, providence seems to have given everywhere the business, if not the science of agriculture, they have by their untiring industry and frugality changed the surface of the county from the appearance of an unyielding forest to a fertile garden.

The time is within the memory of man living to-day, when not one of the numerous implements of farming, now in common use, was even dreamed of.

Farming the rugged primitive soil with plows made almost entirely of wood; harrowing the earth with an implement furnished with wooden teeth; sowing all the grain by hand; cutting it all with the ancient reaping hook or sickle, an operation which, on what is known as a four or six horse farm, required from four to six weeks, and two or more to gather and shelter it; threshing with the ancient flail, or the tread of horses, and cleaning it with the most primitive and unscientific wind-mill. When we from our stand point look back, the wonder is how they ever finished their ordinary work, or had any time for mental improvement. But in those days they were men of physical strength, and the farming implements in use—in addition to those already mentioned—among them seemed to show it.

Farming in those days meant work, and work of the hardest kind, nothing else could meet the wants of the times, or overcome the difficulties which were to be met every where around them, and yet it cannot be denied that these hardy ancestors of ours were equal to the work before them, and the times in which they lived.

By a kind of instinct, or a wisdom drawn from long experience, they adopted a system of rotation which enabled them to produce crops which we of the present day in general cannot excel.

Thrashing eight bushels of wheat from the hundred sheaves was not uncommen in our earliest times, but the labor required to produce these was ten fold as severe as now. Of course the number of acres that were tilled in those days was comparatively small, but the fresh and primitive soil, rich with decayed vegetation and disentegrated limestone (of centuries) enabled them to produce almost as much from the acre as can now be done. In those early days (as for wheat and rye) winter grain chiefly was raised, spring wheat being almost unknown. Seeding time began in the latter part of September, and in the slow and deliberate way of doing things was rarely finished before election time, the second Tuesday in October or thereafter.

The rotation of crops in those days was about this: After manure and lime, winter grain, with clover or timothy; after this, hay and pasture for two years; then Indian corn, followed by a crop of oats, from which we of the present day have not changed much, though we now raise a greater number of crops from the same quantity of ground in the same time.

In the introduction and use of agricultural implements our ancestors were slow. Wedded to their habits, and filled with traditions of the years in which their fathers had lived and flourished, the looked upon these newfangled notions and implements with something like disgust, but gradually the use of some of the more simple, and perhaps useful, machines crept in.

The plow with steel or iron coulters and mold boards, and the harrow with iron teeth, which were so much more durable than the wooden ones, that notions of economy were alone strong enough to turn the scale in their favor.

The cradle then soon superseded the reaping hook, the thrashing machine soon took the place of the flail. Since then one after another of the numerous improved agricultural implements have been introduced, and found more economical and useful than those that had been in use previously. These were adopted from time to time, until, I think, I may safely say, that there is not one known any where that may not be found in Lehigh county. Much of this is owing to the action of the Lehigh County Agricultural Association, that was organized some twenty-seven (27) years ago, and has had its annual exhibitions ever since, except one year, that of 1862, during the rebellion, with increased and increasing interest and value.

In this section of Pennsylvania the Lehigh County Agricultural Society fair is considered to be the most successful, patronized by every one, filled every year with the finest specimens of agriculture, also with specimens of domestic animals, that, when contrasted with those that were in the county before the formation of this Society, are truly wonderful. It has become a sort of school, in which the best ideas on those subjects are taught and learned, and a healthy emulation kept up throughout this part of the State. Under its influence, experiments are tried, some of which are attended with the best results, while others have not, as yet, been fully tested; among the latter is the idea which is entertained by some of our most intelligent farmers, that in preparing limestone for farm use, while we facilitate its use by burning, we, at the same time, deprive it of much of its fertilizing properties. Fields of grain have, therefore, been sown here on land, part of which was limed in the usual way, and a part of which limestone ground to dust was applied, the soil being the same, and the treatment in other respects the same. This experiment will either establish or destroy the theory on which it rests. Such experiments should be encouraged, for it is only by the efforts of well-directed thought and well-directed labor that the agriculturists of this or any other country hope to prosper.

When the census of 1880 is taken, I think we will find a large increase of some of the articles mentioned, not alone in the agricultural products; but, within the past few years, an extended interest has sprung up in the manufacture of butter, and now the manufacture of cheese is being introduced, which shows that our farmers are looking forward to new enterprises for Lehigh county.

LIST OF OFFICIAL REPORTERS OF THE BOARD.

In order that the Secretary of the Board may be kept constantly informed as to the condition of the crops, live stock, and other items of interest in all portions of the State, and that he may have efficient correspondents from whom he may ask for information as to any special locality or special branch of agriculture, horticulture, or rural economy, a corps of three hundred and fifty official reporters has been organized. In order that these may be properly and regularly distributed in all portions of the State, the appointments have been made by members of the Senate and House of Representatives, the parties named have been selected as the representative farmers of the respective districts, and on account of their special fitness for furnishing the needed information.

It is the duty of these reporters to properly fill out and return all blanks sent to them from this office, and to report to the Secretary of the Board the appearance of any unusual diseases of a suspicious nature among the live stock of their district.

The result of this summarized work is shown in the *quarterly* reports and much of it relating to the condition of crops, live stock, &c., being out of date by the time the *annual* report is issued, it is not used therein. In several cases of the out break of epidemic or contagious diseases among live stock, (notably pleuro-pneumonia and splenic or Texas fever,) the first information of its existence has been furnished by these reporters, and the ability thus afforded for immediate and prompt action has saved a large amount to both State and stock owners.

The Secretary would hereby thank the reporters for the efficient and valuable aid which they have given him during the year just closed, and would request that any changes or errors in this list be made known at the earliest possible date.

ADAMS—C. J. Tyson, Floradale; A. W. Storm, East Berlin; D. P. Forney, McSherrystown; E. Maginly, Fairfield; R. Sherfy, Gettysburg.

ALLEGHENY—Dumas Lutz, Seventh ward, Pittsburgh; Moses Chess, Reform School, Pittsburgh; John Voeghtly, Bennett; Andrew Watson, Talley Cavey; B. A. Elliott, No. 114 Market street, Pittsburgh; S. J. Chamberlain, Gill Hall; J. M. Parkinson, West Elizabeth; C. Christy, McKeesport; H. R. Chalfant, Wilkinsburg; J. R. McMichael, Beech Cliff.

ARMSTRONG—H. E. Ehrenfeld, Worthington; Peter Kerr, Worthington; T. H. Allinson, Kittanning; J. W. Little, Sherrett; S. Hamilton, Oakland.

BEAVER—George Hattie, New Brighton; W. Van Swearingen, Hookstown; W. Ewing, McCleary; J. Dillon, New Gallilee; J. S. Elder, Darlington.

BEDFORD—James A. Sill, Stuckeyville; Daniel Z. Replogle, Waterside; William Donahoe, Beans Cove; W. Mason, Cook's Mills; Thomas Fisher, Cumberland Valley; William Elder, Buffalo Mills; W. C. Lutz, Bedford.

BERKS—Hiram G. Kauffman, Reading; Frederick Hosler, Hamburg; Jacob Zerr, Geiger's Mills; D. Y. Peter, Lobachsville; A. Burnett, Reading; William N. Potinger, Bernville; Adam Mannich, North Heidelburg; Levi K. Balthaser, Bernville.

BUTLER—J. W. Cristy, Coultersville; John Humphry, Jacksonville; S. Nixon, Brownsdale; J. C. Moore, McCandless; W. C. Waldron, Breakneck.

BLAIR—Joseph Wagner, Williamsburg; William P. Smith, Hollidaysburg; William McCormick, Sinking Valley; W. McAlister, Royer.

BRADFORD—G. Landon, Herrick; J. S. Howie, Ulster; A. H. Thomas, Troy; J. Ayres, Macedonia; E. Pomeroy, Troy.

BUCKS—Hector Wildman, Langhorne; Henry C. Hartzell, Telford; W. M. Large, Doylestown; David R. Jameson, Quakertown; G. G. Maris, Lahaska; E. Reeder, New Hope.

CAMBRIA—John Marrion, Carrolltown; Valentine Bishop, Loretto; William W. Harris, Johnstown; J. Bearer, Carrolltown; J. J. Kayler, Loretto.

CAMERON—V. A. Brooks, Sterling Run; G. B. Barclay, Sinnemahoning; C. H. Sage, Emporium.

CARBON—Reuben Ziegenfus, Lehigh Gap; David R. Keller, Hudsonville; W. H. Kneclit, Weissport; D. Kalbfus, Mauch Chunk.

CENTRE—Leonard Rhone, Center Hall; John A. Woodward, Howard; Daniel J. Wieland, Linden Hall; John A. Hunter, Half Moon; A. Hoy, Bellefonte.

CHESTER—C. C. Moore, Milford Mills; W. P. Hazard, West Chester; W. W. Parker, Parkersville; John I. Carter, West Grove; Thomas H. Windle, Coatesville; S. H. McConnell, Rockville; S. R. Downing, West Chester.

CLARION—John Henlen, Fryburg; L. F. Randolph, New Athens; I. Neely, Alum Rock; S. H. Stewart, New Athens.

CLEARFIELD—S. L. Kester, Grampian Hills; L. Denning, Clearfield; H. L. McGhee, Ostend; L. Hubler, Grahamstown; A. C. Tate, Clearfield; Miles Wall, Curwensville.

CLINTON—Joel A. Herr, Cedar Springs; Coleman Grugan, Hyner; M. Quigley, Youngwomanstown; J. Wanker, Lock Haven; J. McGhee, Glen Union.

COLUMBIA—J. Sutton, Stillwater; E. W. Tewksburg, Catawissa; C. McHenry, Stillwater; A. P. Young, Millville; N. W. Brown, Mainville.

CRAWFORD—Denny Bros., Meadville; James G. Bramhall, Centerville; John S. Kean, Evansburg; O. L. Williams, Meadville; F. Schriner, Oil Creek; A. B. Finson, Titusville; S. P. Warrener, Center Road; R. McKay, Espyville.

CUMBERLAND—Alfred H. Adams, Mount Rock; T. Chambers, Middlesex; H. Stewart, Carlisle; T. Anderson, New Kingston; G. R. Dykeman, Shippensburg.

DAUPHIN—George Koppenheffer, Berrysburg; Joseph S. Strickler, Hummelstown; James W. Bowman, Halifax; I. B. Nisley, Middletown; H. B. Shriner, Gratz.

DELAWARE—Townsend Speakman, Brandywine Summit; John D. Pierce. Concordville; E. Hood, Newtown Square; I. Trimble, Concordville; G. Drayton, Ivy Mills.

ELK—J. L. Brown, Wilcox; J. C. McAllister, Brandy Camp; A. W. Gray, Caledonia; J. W. Gray, Benezett; J. S. Hytle, Brandy Camp.

ERIE—H. S. Southard, North-East; Henry Gingrich, Erie; S. V. Holliday, North Springfield; J. D. Smith, Wayne; V. R. Gillett, Lebœuf.

FAYETTE—James Blackstone, Collinsville; Jesse Reed, Uniontown; Jesse V. Hoover, Masontown; W. L. Smith, Farmington; Julius Dun, Smithfield; Franklin Bute, East Liberty.

FOREST—Orion Siggins, West Hickory; J. D. Hant, Marionville; W. P. Siggins, West Hickory; John Thompson, Stewart's Run; A. B. Kelley, Tionesta; W. A. Dusenberry, Newton Mills; W. Cook, Cooksburg; W. H. King, East Hickory.

FRANKLIN—J. M. Wilhelm, Fannettsburg; R. Chambers, Chambersburg; J. B. Cook, Fayetteville; W. B. Wingate, Greencastle; A. Stouffer, Chambersburg.

FULTON—Harvey Wishart, Wells' Tannery; William P. Gordon, Warfordsburg; Asa Harris, McConnelsburg; Baltzer E. Barton, Harrisonville.

GREENE—David A. Spragg, Spraggs; J. G. Patterson, Carmichael; S. C. Orr, Jefferson; A. V. Dillie, Wind Ridge; B. H. Clark, Waynesburg.

HUNTINGDON—John Huey, Airy Dale; Ralph Crotzley, Colfax; S. McVitty, Saltillo; B. McDevit, Huntingdon; L. Robb, McConnellstown, C. Wakefield, Allenville.

INDIANA—A. M. Harrison, West Lebanon; Cyrus Stouffer, Blairsville; Samuel C. Hazlet, Kent; T. St. Clair, Thompson Home.

JEFFERSON—S. P. Anderson, Summerville; J. B. Holt, Stanton; R. Dougherty, Warsaw; I. B. Couser, Punxatawney: J. North, Punxatawney.

JUNIATA—James North, Patterson; W. Banks, Mifflintown; J. Patterson, Peru Mills; J. N. Moore, Van Wert; G. W. Graham, Port Royal.

LACKAWANNA—Henry P. Jacobs, Hyde Park; S. G. Oram, Hyde Park; John G. Highfield, Scranton; William H. Freeman, Hyde Park; A. C. Sission, La Plume.

LANCASTER—H. B. Reist, Spring Garden; Martin D. Kendig, Cresswell; Thomas Baker, Octoraro; William T. Clark, Chestnut Level; C. Boyd, Manheim; M. S. Fry, Ephrata; J. J. Brinton, Christiana; J. Miller, Litiz.

LAWRENCE—Martin Reno, Newcastle; Andrew Banks; Neshannock Falls; James M. Lawrence, Plain Grove; James W. McClelland, Mount Jackson; H. McCowan, Ennon Valley; B. Graham, Moravia.

LEBANON—C. Forney, Lebanon; J. W. Grove, Fredericksburg; J. H. Groh, Shaefferstown; M. Bachman, Fontana.

LEHIGH—N. G. Hoffman, Orefield; Charles H. Blank, Coopersburg; Charles Wittman, Lanark; Daniel Kern, Shimersville; D. H. Schall, Fogelsville; D. H. Creitz, Jacksonville.

LUZERNE—W. J. Honeywell, Dallas; Alfred McMurtrie, Conyngham; S. W. Trimmer, White Haven; Irvine Miller, Exeter; Philip Reineman, Wilkes-Barre; Michael Graham, Plymouth; Sylvester Dilley, Wilkes-Barre; E. W. Sturdevant; Wilkes-Barre.

LYCOMING—M. P. Hepburn, Jersey Shore; Daniel Steck, Hughesville; R. R. Gibson, Nesbit; D. J. Thomas, Williamsport; Jos. Hall, Rosevalley.

McKEAN—L. Ramer, Smethport; J. H. Duntley, Smethport; W. K. King, Ceres; John Covin, Kendall Creek.

MERCER—S. S. Donaldson, Jackson Centre; T. P. Dickson, Clarks; J. D. Kirkpatrick, North Liberty; D. Robison, Hermitage; P. Dilley, Mercer; A. Robinson, Mercer.

MIFFLIN—David M. Zook, Belleville; J. Campbell, Belleville.

MONROE—William Gilbert, Pleasant Valley; N. H. Coolbaugh, Coolbaugh's; Abel, Stoner; Brodheadville; F. B. Overfield, Coolbaugh's; W. H. Rinehart, Jackson Corners; John K. Hartzlen, McVeytown.

MONTGOMERY—Solomon K. Grinley, Schwankville; S. Powell Childs, Plymouth Meeting; Mark R. Supplee, King of Prussia; Henry Fry, Limerick Station; Aaron D. Wagner, Hatfield; Elwood Roberts, Gwynedd; M. C. Rambo, Royer's Ford; H. C. Hoover, Hooverton; Seth Wilson, Willow Grove; David Stevens, Abington.

MONTOUR—M. D. L. Schler, Danville; E. Sidler, Danville; J. Shearer, Washingtonville.

NORTHAMPTON—Paul Keppinger, Nazareth; Reuben D. Rohn, Bath; J. J. Ealer, Easton; George H. Heiney, Cherry Valley; W. McMiller, Portland; Robert S. Brown, Bethlehem.

NORTHUMBERLAND—C. P. Reinhart, Sunbury; J. Derr, Sunbury; W. Fullmer, Milton; G. Smith, Mahanoy; J. Moore, Pott's Grove.

PERRY—Robert P. Cochran, Millerstown; D. B. Milliken, Landisburg; B. F. Hall, Sherman's Dale.

PHILADELPHIA—Peter Cleary, care of George W. Hall, 1131, Arch street, Philadelphia; W. H. Wakefield, Philadelphia; Alexander P. Crawford, Trenton street, above Otis, Philadelphia; David Seisler, New Drove-Yard, Rising Sun; Henry Devenney, 203, Lombard street; Joseph L. Jones, 603, North Eighth street; William E. Hamill, Frankford; Lester Comly, Bryberry; G. W. Rhawn, Fox Chase.

PIKE—Samuel Peters, Bushkill; M. C. Westbrook, Blooming Grove; S. Cuddeback, Milford; C. Swartwout, Delaware; E. J. Baker, Milford; Hon. William Cromwell, Hawley; James Rose, Matamoras; William Westfall, Rowland.

POTTER—L. D. Estes, Oswayo; J. W. Allen, Coudersport; J. E. Harvey, West Bingham; H. J. Reynolds, Brookland.

SCHUYLKILL—James L. Nutting, Pine Grove; Thomas M. Shollenberger, Pottsville; D. F. Greene, Barry; Elias Artz, Valley View; J. Metig, Auburn.

SNYDER—Henry Moyer, Salem; L. Kepler, Mt. Pleasant Mills.

SOMERSET—Peter Heffley, Somerset; N. Scott, Ursina; S. Philson, Berlin; S. S. Forney, Berlin.

SULLIVAN—Richard Bedford, Campbellville; L. B. Speaker, Hills Grove.

SUSQUEHANNA—T. T. Birchard, Birchardville; O. Washburn, Smiley; G. H. Harvey, Rush; J. Jennings, New Milford.

TIOGA—F. A. Allen, Mansfield; Charles Tubbs, Osceola; D. G. Edwards, Cherry Flats; M. Lee, Academy Corners; L. Gray, Mainesburg.

UNION—J. P. Follmer, Cairo; R. V. B. Lincoln, Laurelton; D. W. Pellman, Mifflinburg; S. Clingan, Kelly Point; J. A. Gundy, Lewisburg.

VENANGO—J. G. Siggins, Pleasantville; John F. Alcorn, Titusviille; J. Davidson, Porterfield; J. A. Allen, Wesley; W. Bell, Franklin.

WARREN—G. P. Mead, Youngsville; D. Lott, Lottsville; L. L. Spencer, Columbus; F. R. Miller, Sugar Grove.

WASHINGTON—William L. Archer, Burgettstown; Elmer A. Deems, Beallsville; John A. Hopper, Finleyville; Samuel Weir, Vanceville; J. Sawhill, Taylorstown; J. M. Boyce, Patterson Mills.

WAYNE—E. W. Hamlin, Bethany; T. J. Crocker, Eldred; George W. Simms, Hamilton; H. K. Stone, Pleasant Mount; Calvin E. Kilpatrick, Tallmanville.

WESTMORELAND—S. B. Markle, Jr., West Newton; Michael Keefer, Sr. Ligonier; T. Donohue, Greensburg; F. Y. Clopper, Greensburg; William Carothers, Irvin's; Adam Stoner, Stoner's; R. S. Jameson, Greensburg; Samuel Warden, Mount Pleasant.

WYOMING—Lewis Armitage, Factoryville; J. G. Spaulding, Forkston; G. W. Fassett, Scottsville; G. Roberts, Falls.

YORK—W. Miller, York; E. D. Bentzell, York; E. H. Gerry, Shrewsbury; S. H. Allen, New Park; J. M. Heiges, York.

In closing this report, the Executive Committee would express their regret that the limited space at their disposal has compelled the omission of much valuable matter, consisting, in the aggregate, of several hundred pages. By order of the Board, committees were appointed to visit the fair of each county society represented in the Board. The report of these committees, aggregating some thirty pages of valuable matter, is crowded out of this report, but will be found in the Quarterly Report for December, January, and February. A large number of interesting reports and essays have also been crowded out, but the limited space assigned for the quarterly reports will preclude their insertion even there.

CONDITION OF GROWING CROPS—1879.

NOVEMBER REPORTS OF OFFICIAL REPORTERS.

COUNTIES.	COMPARED WITH LAST YEAR						COMPARED WITH AVERAGE OF TEN YEAR'S.						WHEAT.	
	Wheat.	Rye.	Clover stubble.	Timothy stubble.	Natural pasture.	Wheat stubble.	Wheat.	Rye.	Clover stubble.	Timothy stubble.	Natural pasture.	Wheat stubble.	Acreage of wheat compared with last year.	Acreage of wheat compared with acreage of ten years.
Adams,	105	100	75	80	90	95	100	100	95	90	95	90	107	105
Allegheny,	75	85	100	100	100	75	90	90	1 0	100	98	75	115	125
Armstrong,	95	95	90	90	87	85	90	90	85	88	80	85	102	108
Beaver,	107	102	100	102	105	105	100	100	104	105	100	100	110	115
Bedford,	75	75	100	100	100	95	80	82	102	101	100	95	100	90
Berks,	125	125	100	100	90	90	100	101	100	100	90	85	105	102
Blair,	105	105	90	95	90	85	100	100	100	98	90	89	102	100
Bradford,	110	105	100	100	90	89	100	100	100	99	99	90	106	110
Bucks,	110	110	65	95	95	100	100	100	100	100	95	90	100	100
Butler,	130	125	85	85	80	75	112	112	112	105	95	90	110	110
Cambria,	1 0	105	90	95	85	90	105	105	100	100	95	95	115	110
Cameron,	115	1'5	100	100	100	90	110	111	100	100	90	90	117	117
Carbon,	120	120	95	95	95	90	107	107	100	100	90	85	120	110
Centre,	90	90	90	90	90	80	101	102	100	100	90	87	105	105
Chester,	1.0	100	100	100	95	90	104	100	100	95	95	90	100	100
Clarion,	125	105	100	100	95	95	107	105	100	100	90	90	115	105
Clearfield,	118	115	100	100	98	90	108	105	100	100	92	90	110	105
Clinton,	105	105	100	100	80	80	100	100	100	100	90	85	110	110
Columbia,	95	95	85	85	75	75	100	100	100	95	86	80	95	105
Crawford,	107	100	100	90	85	90	100	100	100	98	95	85	110	107
Cumberland,	118	101	100	100	80	80	105	100	100	100	90	75	100	100
Dauphin,	110	102	100	95	90	85	107	107	100	100	98	95	104	103
Delaware,	125	107	98	95	90	85	105	107	100	100	99	92	102	102
Elk,	90	90	85	90	85	90	90	90	85	95	95	90	105	125
Erie,	118	104	89	85	87	87	110	102	85	90	85	90	105	125
Fayette,	98	95	89	95	85	90	100	100	95	100	95	90	98	100
Forest,	102	101	95	100	90	90	100	100	98	100	90	85	99	102
Franklin,	108	101	100	105	100	102	100	100	100	101	100	100	101	108
Fulton,	90	90	90	100	90	87	95	95	95	100	90	95	110	105
Greene,	104	100	95	100	98	97	100	100	90	100	98	92	102	107
Huntingdon,	110	100	100	100	98	98	100	100	97	100	95	80	115	110
Indiana,	115	102	98	100	95	90	107	102	90	100	95	85	101	100
Jefferson,	120	100	95	98	82	95	100	100	100	90	95	95	120	145
Juniata,	90	92	100	100	95	80	101	101	97	100	100	80	100	105
Lackawanna,	110	102	98	100	92	89								
Lancaster,	105	110	75	87	90	90	100	100	85	100	95	95	95	100
Lawrence,	112	110	90	100	90	95	107	105	95	100	95	95	105	110
Lebanon,	104	102	95	100	90	90	100	100	100	100	95	95	101	100
Lehigh,	103	95	90	100	97	87	99	99	92	100	98	90	105	103
Luzerne,	111	110	90	100	95	97	104	102	95	100	95	100	100	100
Lycoming,	101	100	95	100	95	95	100	100	100	100	95	95	100	100
McKean,	110	105	98	100	98	95	101	101	99	100	95	90	109	111
Mercer,	105	1.0	95	100	90	100	99	95	90	95	75	85	110	107
Mifflin,	112	110	98	100	98	95	102	102	100	100	90	95	102	104
Monroe,	105	110	95	102	100	100	100	100	98	101	98	95	100	125
Montgomery,	110	110	98	100	95	98	102	102	100	100	98	100	100	104
Montour,	107	104	100	100	100	95	102	101	100	100	95	95	102	115
Northampton,	104	108	100	100	100	90	100	100	100	100	98	95	100	108
Northumberland	110	110	98	100	95	95	102	101	100	100	90	92	100	100
Perry,	100	100	90	95	98	85	100	100	100	100	95	98	104	111
Philadelphia,	107	105	95	98	95	90	101	100	100	100	90	90	90	90
Pike,	104	100	90	95	95	90	100	100	100	100	95	90	105	110
Potter,	100	100	90	85	90	95	100	100	100	100	98	90	95	109
Schuylkill,	95	100	85	100	95	85	95	100	89	100	95	90	100	110
Snyder,	115	115	90	95	75	80	107	107	95	100	95	90	115	120
Somerset,	90	90	100	100	98	95	95	95	100	100	98	95	105	104
Sullivan,	95	95	75	78	70	75	90	90	70	79	75	80	110	104
Susquehanna,	110	104	90	100	95	90	102	100	100	100	95	90	107	104
Tioga,	105	104	95	100	97	95	100	100	100	100	90	90	105	110
Union,	90	100	75	100	90	75	90	90	90	98	89	90	100	100
Venango,	100	100	90	100	95	90	100	100	95	100	95	90	108	107
Warren,	102	100	90	100	98	95	100	100	98	100	98	92	111	115
Washington,	103	100	98	100	90	95	100	100	100	100	95	95	109	111
Wayne,	102	101	95	100	90	95	100	100	90	100	90	90	105	107
Westmoreland,	100	100	95	100	95	90	100	100	100	100	95	90	102	104
Wyoming,	110	110	90	100	98	98	100	100	95	100	95	90	102	107
York,	110	110	98	100	95	95	100	100	94	100	98	98	101	102

ACREAGE OF CROPS—1879.

FROM RETURNS OF OFFICIAL REPORTERS.

COUNTIES.	ACREAGE COMPARED WITH LAST YEAR.					ACREAGE COMPARED WITH THE AVERAGE OF LAST FIVE YEARS.				
	Wheat, (1879.)	Wheat, spring, (1879.)	Corn.	Oats.	Rye.	Wheat, (1879.)	Wheat, spring, (1879.)	Corn	Oats.	Rye.
Adams,	100	....	100	90	85	100	....	100	87	80
Allegheny,	95	....	100	100	100	110	....	100	90	87
Armstrong,	110	....	105	105	102	105	....	102	104	102
Beaver,	110	....	100	100	87	120	....	110	105	100
Bedford,	100	....	101	101	100	104	....	100	100	100
Berks,	95	....	100	95	105	102	....	100	100	100
Blair,	102	...	100	100	102	100	....	101	101	100
Bradford,	95	85	100	95	95	105	104	103	104	102
Bucks,	100	....	100	95	90	100	....	100	90	90
Butler,	120	....	102	110	110	120	....	103	100	115
Cambria,	100	....	90	100	85	110	....	105	104	104
Cameron,	90	110	101	100	101	110	110	108	105	110
Carbon,	130	....	102	108	108	120	....	105	105	110
Centre,	90	....	100	100	100	100	....	98	100	95
Chester,	100	....	101	101	100	100	....	100	100	100
Clarion,	100	..	101	102	101	105	....	104	104	103
Clearfield,	105	105	105	105	100	110	110	110	106	104
Clinton,	98	....	98	100	95	110	....	105	104	102
Columbia,	100	....	100	100	101	102	....	104	104	100
Crawford,	100	....	97	98	100	102	....	102	102	101
Cumberland,	103	....	101	89	95	103	....	100	100	100
Dauphin,	95	....	105	95	100	95	....	105	100	100
Delaware,	102	....	105	75	100	100	....	105	75	105
Elk,	100	....	100	102	100	123	....	100	105	100
Erie,	95	....	100	93	95	102	....	103	90	98
Fayette,	105	....	101	100	100	115	....	100	90	85
Forest,	110	100	100	107	105	110	100	115	120	115
Franklin,	100	....	102	98	95	105	...	105	95	92
Fulton,	90	....	100	100	90	100	....	95	100	90
Greene,	87	....	105	100	102	100	....	102	101	104
Huntingdon,	98	....	98	98	97	100	....	100	95	100
Indiana,	102	....	106	100	107	100	....	102	100	110
Jefferson,	95	....	100	100	75	125	....	100	100	85
Juniata,	98	....	100	100	95	98	....	100	100	100
Lackawanna,	102	....	108	102	90	105	....	105	105	102
Lancaster,	103	....	105	100	106					
Lawrence,	100	....	90	105	95	105	....	95	105	100
Lebanon,	100	....	100	100	90	100	....	100	100	100
Lehigh,	90	....	100	100	110	105	....	100	100	92
Luzerne,	90	....	95	98	100	93	....	98	100	98
Lycoming,	100	...	100	100	90	100	....	100	100	92
McKean,	89	80	110	90	95	100	85	105	100	98
Mercer,	100	....	100	100	100	102	....	101	102	100
Mifflin,	100	....	108	105	100	95	....	107	107	102
Monroe,	87	....	107	104	105	95	....	105	105	105
Montgomery,	100	....	104	95	95	100	....	102	100	101
Montour,	98	....	101	104	102	107	....	105	102	104
Northampton,	89	....	100	95	101	90	....	100	92	101
Northumberland,	100	....	100	100	101	102	....	101	104	102
Perry,	110	....	102	110	104	105	....	102	115	102
Philadelphia,	105	....	100	95	85	100	....	100	100	95
Pike,	105	100	110	110	110	105	....	105	115	115
Potter,	100	100	102	101	104	104	104	104	102	104
Schuylkill,	105	....	108	100	85	110	....	105	100	100
Snyder,	107	....	103	90	70	102	....	102	90	78
Somerset,	98	....	107	102	100	110	....	115	100	95
Sullivan,	95	75	105	110	93	95	95	105	110	100
Susquehanna,	97	98	100	103	95	102	98	100	100	90
Tioga,	105	105	100	100	92	105	100	100	98	92
Union,	102	....	105	105	95	100	100	100	100	100
Venango,	105	90	100	107	100	95	90	105	107	102
Warren,	90	80	95	95	100	100	90	107	100	92
Washington,	100	....	104	100	90	104	....	103	108	90
Wayne,	90	85	90	95	100	95	96	89	100	100
Westmoreland,	100	90	105	105	90	95	90	102	101	90
Wyoming,	102	100	98	90	94	100	....	100	97	97
York,	89	....	101	101	98	100	....	101	102	98

CONDITION OF FARM STOCK—1879.

FROM MAY RETURNS OF OFFICIAL REPORTERS.

COUNTIES.	CONDITION OF FARM STOCK COMPARED WITH LAST YEAR.							CONDITION OF FARM STOCK COMPARED WITH AVERAGE OF FIVE YEARS.						
	Horses.	Mules.	Oxen.	Cows.	Sheep	Swine.	Fat cattle.	Horses.	Mules.	Oxen.	Cows.	Sheep.	Swine.	Fat cattle
Adams,	100	100	85	95	75	100	95	100	100	95	97	95	100	100
Allegheny,	100	...	.	100	105	100	100	105	...	..	110	100	115	100
Armstrong,	103	103	102	89	98	100	85	102	102	104	100	102	100	100
Beaver,	100	100	100	102	104	100	105	100	100	101	105	102	101	95
Bedford,	95	100	105	102	104	101	102	100	100	104	110	103	102	100
Berks,	105	105	101	102	100	105	108	102	102	103	108	100	101	104
Blair,	95	100	98	94	100	101	98	100	100	98	97	95	100	100
Bradford,	100	100	105	100	98	93	100	100	100	103	105	105	95	100
Bucks,	100	100	100	93	100	100	95	100	100	100	98	100	95	98
Butler,	100	...	...	100	100	110	.	100	...	...	105	105	105	
Cambria,	90	105	90	100	100	85	105	100	100	90	100	85	85	95
Cameron,	100	100	98	102	104	100	95	101	98	102	98	100	100	100
Carbon,	100	91	94	105	94	101	100	100	95	89	98	100	101	95
Centre,	102	102	...	90	100	95	98	103	108	102	100	101	101	98
Chester,	104	102	101	100	100	100	108	102	102	104	100	100	101	100
Clarion,	105	100	105	110	101	104	100	105	105	105	104	102	100	102
Clearfield,	100	100	100	95	95	98	100	100	100	100	98	95	98	95
Clinton,	95	95	90	100	100	100	95	95	95	95	100	100	98	95
Columbia,	100	100	101	102	95	98	100	104	100	98	100	101	102	98
Crawford,	99	...	100	95	95	100	100	98	...	100	100	100	95	95
Cumberland,	102	102	100	100	95	102	100	100	100	100	102	101	104	100
Dauphin,	100	92	100	98	100	100	95	108	108	102	100	104	105	100
Delaware,	105	100	95	102	89	90	95	100	100	85	105	89	87	95
Elk,	100	100	100	94	91	100	100	100	100	100	95	95	100	100
Erie,	100	..	105	96	95	100	105	102	...	100	98	100	100	102
Fayette,	100	100	98	99	100	95	98	98	100	100	99	101	102	100
Forest,	92	95	85	80	87	89	95	98	98	90	89	98	90	95
Franklin,	97	97	100	100	99	95	100	98	98	100	100	93	95	100
Fulton,	102	100	95	105	92	90	92	95	98	97	100	92	98	100
Greene,	92	92	90	83	100	89	92	94	94	100	100	101	98	94
Huntingdon,	105	100	100	105	95	100	100	102	100	100	105	100	102	100
Indiana,	105	105	100	107	102	92	98	90	90	100	100	102	98	89
Jefferson,	95	100	90	95	90	80	85	95	100	95	95	80	80	95
Juniata,	102	102	100	102	101	91	92	100	100	95	90	93	95	98
Lackawanna,	97	100	102	98	102	100	102							
Lancaster,	105	105	107	105	105	95	105	109	110	107	105	102	100	107
Lawrence,	100	100	100	107	107	100	95	95	100	100	105	105	100	98
Lebanon,	100	100	101	100	98	102	100	102	102	105	105	101	101	102
Lehigh,	100	101	100	102	98	95	90	100	100	98	95	95	90	104
Luzerne,	95	100	93	90	98	90	100	99	100	95	100	95	97	100
Lycoming,	100	100	92	90	100	95	105	100	100	84	91	100	89	100
McKean,	100	101	90	90	98	99	100	100	100	95	93	100	100	98
Mercer,	100	100	90	101	100	100	95	102	100	100	102	98	98	98
Mifflin,	90	100	100	105	101	102	101	100	101	102	100	104	100	100
Monroe,	90	90	95	85	100	102	103	100	100	98	105	105	101	105
Montgomery,	100	100	100	101	100	105	102	107	105	100	102	102	105	105
Montour,	89	89	90	94	92	93	98	100	100	100	102	103	101	100
Northampton,	95	99	95	90	100	105	100	105	104	100	90	100	100	100
Northumberland,	100	100	100	92	98	101	102	100	100	100	98	95	101	98
Perry,	95	90	95	101	100	100	93	90	90	89	102	98	100	93
Philadelphia,	105	...	...	101	105	100	...	100	100	101	104	105	100	
Pike,	102	104	101	100	92	100	96	104	104	104	102	102	105	104
Potter,	95	100	100	98	106	100	98	106	100	100	105	110	100	100
Schuylkill,	100	100	100	100	102	101	100	95	95	95	100	100	103	100
Snyder,	100	100	90	90	90	85	100	100	100	100	98	98	95	97
Somerset,	103	105	105	105	102	95	100	105	100	102	105	103	93	102
Sullivan,	100	102	105	100	107	90	100	100	100	100	101	110	85	98
Susquehanna,	98	98	98	89	95	95	98	100	100	95	91	98	98	97
Tioga,	100	90	100	90	100	98	99	101	98	100	97	104	95	95
Union,	103	...	...	97	105	95	98	100	...	...	98	105	97	96
Venango,	100	100	100	102	110	100	100	105	100	110	110	100	100	105
Warren,	100	100	100	94	95	100	94	100	100	104	97	98	100	91
Washington,	100	95	95	100	105	95	100	105	100	100	105	105	95	100
Wayne,	94	100	100	105	100	94	90	98	104	90	100	105	95	90
Westmoreland,	105	106	100	100	105	100	100	110	115	100	98	107	100	96
Wyoming,	100	100	100	93	98	100	99	100	100	100	97	100	102	100
York,	100	101	102	107	100	107	110	110	102	100	110	107	105	110

CONDITION OF FARM STOCK—1879.

FROM NOVEMBER RETURNS OF OFFICIAL REPORTERS.

COUNTIES.	COMPARED WITH LAST YEAR.							AVERAGE OF LAST TEN YEARS.						
	Horses.	Mules.	Oxen.	Cows.	Sheep.	Swine.	Fat cattle.	Horses.	Mules.	Oxen.	Cows.	Sheep.	Swine	Fat cattle.
Adams,	101	100	100	96	98	100	98	100	100	96	90	90	100	85
Allegheny,	100	98	87	95	90	98	90	95	95	85	92	87	100	90
Armstrong,	100	100	90	89	95	100	90	100	100	95	90	100	100	90
Beaver,	100	98	90	95	90	102	90	100	100	95	98	95	100	92
Bedford,	100	100	95	90	90	100	90	100	96	95	95	100	100	90
Berks,	100	100	98	98	95	100	90	100	100	85	90	95	100	90
Blair,	100	100	100	98	95	100	98	95	100	95	95	98	100	93
Bradford,	95	95	90	90	92	98	90	100	100	95	92	95	100	90
Bucks,	100	100	95	98	99	102	95	100	100	98	100	98	104	95
Butler,	102	102	98	95	90	100	97	100	100	98	100	98	100	95
Cambria,	100	100	95	98	99	96	95	100	100	95	100	90	100	95
Cameron,	100	100	96	95	100	100	90	95	100	90	90	98	100	96
Carbon,	100	100	94	100	100	104	85	104	100	85	87	95	100	99
Centre,	100	100	85	93	100	102	87	100	99	87	90	87	95	95
Chester,	95	98	90	95	102	100	89	100	95	89	90	96	99	100
Clarion,	100	100	90	96	104	100	92	100	100	87	90	100	98	95
Clearfield,	102	105	95	99	100	95	93	100	100	92	93	100	102	98
Clinton,	100	100	90	94	100	100	87	100	100	95	93	100	101	97
Columbia,	100	100	94	92	96	100	99	95	100	86	90	102	95	99
Crawford,	100	100	92	85	98	100	100	99	98	93	87	100	104	100
Cumberland,	105	100	94	90	93	100	100	97	97	95	90	100	93	95
Dauphin,	102	100	95	99	90	104	100	102	101	97	85	95	101	97
Delaware,	100	100	95	94	95	100	97	100	100	94	95	98	100	95
Elk,	100	100	98	96	100	100	95	100	100	95	86	96	99	90
Erie,	100	100	97	90	100	100	98	100	100	95	80	98	100	92
Fayette,	100	100	100	85	100	101	92	101	100	98	87	100	100	93
Forest,	101	101	95	80	100	102	85	100	100	85	82	100	100	92
Franklin,	100	100	96	87	101	100	97	100	100	87	81	100	100	91
Fulton,	99	95	95	92	104	95	87	100	95	89	83	100	100	90
Greene,	100	100	92	97	92	92	89	100	100	100	87	98	100	87
Huntingdon,	101	102	85	90	95	100	92	100	100	93	88	98	100	82
Indiana,	102	100	85	89	96	100	93	100	96	98	89	95	100	81
Jefferson,	100	93	85	92	92	100	98	100	93	92	91	97	100	92
Juniata,	93	100	85	97	98	100	97	100	97	98	92	92	100	98
Lackawanna,	99	96	90	98	99	100	94							
Lancaster,	98	96	92	100	101	100	95	100	100	100	97	93	100	87
Lawrence,	102	98	90	96	100	100	100	100	101	100	100	96	100	86
Lebanon,	104	100	98	94	100	100	100	96	102	100	98	99	100	80
Lehigh,	100	100	92	96	100	100	98	100	100	100	99	100	99	95
Luzerne,	105	100	95	97	100	102	98	100	90	92	95	100	97	98
Lycoming,	100	100	91	90	100	100	99	102	93	95	87	95	94	97
McKean,	100	100	96	92	95	102	100	100	102	94	85	99	92	92
Mercer,	95	100	99	98	98	101	100	96	100	98	92	100	93	96
Mifflin,	100	102	100	99	92	96	95	98	104	92	93	92	92	100
Monroe,	100	102	100	100	98	92	94	100	100	85	97	97	100	100
Montgomery,	100	101	95	100	95	104	90	97	100	87	92	98	102	91
Montour,	100	100	96	92	97	102	86	100	100	92	93	92	104	93
Northampton,	100	100	98	98	99	100	100	98	93	93	96	99	100	95
Northumberland,	100	100	96	94	100	100	100	100	100	98	85	86	100	93
Perry,	95	100	92	96	100	100	92	100	99	89	80	98	100	92
Philadelphia,	100	100	. .	100	100	100	98	100	96	100	65	97	100	97
Pike,	100	100	95	85	98	100	98	100	100	95	95	100	100	99
Potter,	100	100	92	92	97	100	97	100	100	92	90	100	100	95
Schuylkill,	100	100	82	95	90	100	92	100	100	97	90	99	100	96
Snyder,	101	100	86	98	92	99	95	100	99	96	90	100	100	97
Somerset,	100	100	92	100	100	98	97	100	99	90	90	97	100	98
Sullivan,	102	100	95	100	100	100	100	99	95	89	92	92	100	99
Susquehanna,	100	100	84	98	98	93	100	98	95	82	91	98	100	92
Tioga,	101	96	98	97	94	98	98	100	100	83	94	99	101	85
Union,	102	98	100	92	91	97	98	100	100	97	97	99	101	87
Venango,	100	100	100	96	98	100	97	100	95	92	96	100	102	82
Washington,	100	100	100	94	99	99	90	100	96	91	94	100	99	93
Wayne,	100	100	91	98	97	100	92	100	100	98	97	99	98	97
Westmoreland,	100	100	92	100	90	100	95	100	99	99	98	98	99	98
Wyoming,	100	100	94	100	98	100	98	100	98	97	97	97	100	92
York,	100	100	97	98	98	100	98	100	100	98	96	98	100	95

PRICES OF FARM PRODUCT AND STOCK IN NEAREST MARKET—1879.

FROM MAY RETURNS OF OFFICIAL REPORTERS.

COUNTIES.	Wheat—per bus.	Rye—per bushel.	Oats—per bus.	Corn—per bus.	Clover seed—per bushel.	Timothy seed—per bushel.	Potatoes—per bushel.	Hay—per ton.	Butter—per lb.	Ewes, fat—per head.	Lambs—per head	Horses-average.	Mules—average.	Cows-average.
Adams,	$1 00	$0 45	$0 24	$0 45	$3 50	$1 25	$0 90	$6 00	$0 14	$4 00	$2 50	$77	$100	$27
Allegheny,	95	62	25	46	4 00	1 40	90	11 00	24	4 50	3 00	89	. .	33
Armstrong,	1 00	52	25	42	3 90	1 30	68	8 50	17	4 50	2 50	85	75	28
Beaver,	98	56	28	42	4 00	1 30	90	7 00	18	3 25	2 50	80	90	25
Bedford,	95	62	31	62	3 75	2 00	85	8 00	17	3 00	2 50	75	90	25
Berks,	98	47	29	50	4 50	2 75	95	8 50	18	3 00	2 50	98	104	30
Blair,	1 00	52	32	50	4 00	2 25	1 00	11 00	20	3 25	2 50	80	95	26
Bradford,	1 00	51	33	49	4 50	2 00	90	7 00	14	4 50	3 25	95	100	28
Bucks,	1 05	56	29	48	4 75	2 25	1 10	8 00	28	4 50	4 00	100	110	33
Butler,	1 00	52	26	49	4 25	2 10	75	8 10	15	5 00	2 75	75	75	21
Cambria,	1 00	60	35	60	5 00	2 25	1 00	11 00	18	3 50	3 00	75	75	30
Cameron,	1 10	60	35	56	5 00	2 00	1 10	13 00	18	. . .	. . .	9[illegible]	95	32
Carbon,	1 08	60	34	58	5 10	2 10	1 20	14 00	17	.	. .	95	98	31
Centre,	1 00	50	25	50	3 75	1 75	80	8 00	15	4 00	2 25	70	72	25
Chester,	1 05	56	28	49	4 00	1 75	1 05	9 00	20	4 50	4 00	80	95	35
Clarion,	1 02	60	28	41	5 00	2 50	1 02	9 00	18	3 50	2 00	75	80	28
Clearfield,	1 00	75	35	46	5 00	2 00	1 00	10 00	20	3 00	2 00	85	90	25
Clinton,	1 00	65	35	55	4 20	2 00	85	8 00	20	4 00	2 25	95	95	30
Columbia,	95	48	28	50	4 10	2 00	60	6 00	17	3 75	2 25	80	80	27
Crawford,	1 00	58	25	43	4 75	1 75	80	7 00	10	4 00	3 00	75	. . .	26
Cumberland,	1 04	40	27	40	3 10	1 45	87	8 00	15	3 25	3 75	95	95	25
Dauphin,	1 00	50	25	48	4 00	. .	85	10 00	21	. . .	. . .	85	83	28
Delaware,	1 10	60	35	42	4 00	2 00	1 15	8 00	30	5 00	4 50	100	115	40
Elk,	1 15	75	40	45	4 50	2 50	1 00	12 00	20	. . .	. . .	75	72	29
Erie,	1 08	55	30	41	3 75	1 75	1 00	7 50	14	. .	.	97	. . .	29
Fayette,	1 02	60	27	43	4 50	1 87	82	8 00	18	4 50	2 75	90	89	33
Forest,	1 04	67	33	55	4 75	2 00	1 00	10 50	18	. .	. .	75	80	25
Franklin,	1 02	58	29	48	3 25	1 50	1 00	7 50	16	3 50	2 25	83	89	25
Fulton,	1 02	70	35	52	4 25	2 00	77	9 00	14	3 50	2 00	65	75	24
Greene,	89	55	20	47	3 00	1 75	87	6 00	12	4 00	3 00	75	50	23
Huntingdon,	1 00	55	30	50	4 00	1 50	90	8 00	18	6 00	3 00	95	85	30
Indiana,	1 00	48	24	45	4 00	1 50	90	7 50	16	4 25	2 00	85	75	30
Jefferson,	1 05	70	33	48	4 50	2 00	55	9 00	14	3 00	2 50	95	95	24
Juniata,	1 00	60	25	48	3 75	2 00	75	8 00	14	3 75	2 75	78	80	25
Lackawanna,	1 16	48	32	47	4 50	2 00	1 00	12 00	17	4 00	3 00	100	105	33
Lancaster,	1 06	56	32	45	3 75	2 00	1 05	8 00	25	5 50	2 75	105	1[illegible]0	35
Lawrence,	1 00	62	25	40	3 75	1 63	75	6 50	14	4 00	2 50	85	90	28
Lebanon,	1 06	48	24	49	3 62	1 25	1 05	7 50	12	4 75	3 00	95	100	25
Lehigh,	1 10	50	26	45	3 25	1 75	80	9 00	18		. .	100	1[illegible]0	33
Luzerne,	1 10	50	28	46	4 00	1 87	90	10 00	17	5 00	3 00	85	95	25
Lycoming,	1 03	60	27	48	4 00	3 00	90	9 00	19	3 50	2 25	95	98	25
McKean,	1 14	63	35	56	4 75	2 00	1 00	8 50	15	3 25	2 50	75	75	30
Mercer,	1 02	68	24	45	3 75	1 75	75	7 50	14	4 00	3 00	105	110	28
Mifflin,	1 00	60	25	60	3 75	1 40	1 00	9 25	15	4 00	2 75	75	70	26
Monroe,	1 00	52	30	50	4 75	2 00	60	9 00	13	4 00	3 25	100	75	25
Montgomery,	1 06	54	30	50	5 00	2 00	1 10	8 00	28	4 00	3 00	100	100	34
Montour,	1 00	43	25	43	4 00	1 75	70	8 00	17	4 00	3 00	75	75	31
Northampton,	1 12	49	30	45	4 25	2 10	90	9 00	17	4 00	3 00	105	105	35
Northumberland,	1 04	50	30	50	4 00	2 00	60	10 00	20	5 00	3 00	100	105	30
Perry,	1 02	50	26	43	3 50	1 40	65	8 50	12	4 00	2 75	75	87	24
Philadelphia,	1 10	58	32	48	4 50	1 75	1 20	12 00	30	4 00	4 00	190	115	33
Pike,	1 16	70	40	50	4 25	2 00	73	8 00	24	4 00	3.00	95	100	33
Potter,	1 05	65	35	50	4 75	2 00	75	9 00	14		. . .	80	85	27
Schuylkill,	1 06	53	33	51	4 00	1 75	80	11 50	20	5 00	3 00	65	60	33
Snyder,	1 05	43	25	44	3 50	1 75	65	7 50	15	4 00	2 25	75	80	22
Somerset,	90	60	40	60	5 00	1 50	60	7 50	14	3 50	. . .	74	76	25
Sullivan,	1 00	54	31	55	4 50	1 75	75	9 00	17	4 00	2 50	90	85	27
Susquehanna,	1 05	60	31	48	5 00	1 60	77	7 50	15	5 00	3 00	75	70	26
Tioga,	1 00	75	35	56	4 24	2 00	75	6 00	15	4 75	2 25	80	75	27
Union,	1 00	60	26	40	4 00	2 50	87	9 00	14	3 75	. .	85	. . .	31
Venango,	1 00	75	28	50	4 00	2 00	70	9 50	15	4 00	2 00	75	70	27
Warren,	1 07	70	36	51	5 00	1 75	1 00	6 25	14	3 50	2 00	75	80	26
Washington,	1 00	55	27	45	4 25	1 50	75	7 00	16	4 00	2 75	75	80	35
Wayne,	1 00	70	35	60	5 50	2 00	75	7 50	13	4 25	2 50	85	90	30
Westmoreland,	1 00	58	30	45	4 10	1 75	73	7 00	17	5 00	3 00	95	. . .	27
Wyoming,	1 05	45	30	45	4 50	1 65	70	10 00	16	4 00	2 75	80	75	26
York,	1 05	45	27	42	3 50	1 50	1 00	10 25	15	5 00	3 50	75	80	26
Average,	$1 04	$0 57	$0 29	$0 47	$4 44	$1 89	$0 86	$8 28	$0 18	$4 33	$2 95	$86	$77	$29

PRICES OF FARM PRODUCTS AND STOCK.

FROM NOVEMBER RETURNS OF OFFICIAL REPORTERS, (NOVEMBER 1.)

COUNTIES.	Wheat per bushel.	Rye per bushel.	Oats per bushel.	Corn per bushel, (old.)	Potatoes per bushel.	Butter per pound.	Ewes (fat) per head.	Horses, (average.)	Mules per head.	Cows, (average.)	Ewes (poor) per head.	Wethers (poor) per head.
Adams,	$1 28	$0 70	$0 32	$0 50	$0 60	$0 16	$3 00	$75	$100	$30	$2 75	$3 00
Allegheny,	1 25	82	39	52	50	25	3 50	115	100	35	2 87	3 15
Armstrong,	1 28	75	37	48	30	18	3 25	87	78	28	2 70	2 90
Beaver,	1 30	73	34	50	47	18	2 90	77	80	28	2 10	2 25
Bedford,	1 29	78	38	51	37	20	2 60	74	82	26	2 00	2 50
Berks,	1 35	80	36	60	50	18	. . .	95	105	28		
Blair,	1 30	78	36	54	48	19	2 75	98	100	27	2 10	2 50
Bradford,	1 28	72	35	48	45	18	2 62	89	95	26	2 20	2 75
Bucks,	1 35	82	38	57	50	28	4 50	100	100	35	3 00	3 50
Butler,	1 25	70	32	47	42	18	2 75	78	90	28	2 20	2 50
Cambria,	1 20	60	30	42	40	15	2 50	75	85	24	2 20	2 75
Cameron,	1 15	58	30	43	38	14	3 00	70	87	21	2 10	2 50
Carbon,	1 25	60	32	45	40	16	3 20	82	90	26	2 50	3 00
Centre,	1 33	65	34	48	40	18	3 75	90	98	25	2 50	2 75
Chester,	1 35	80	39	58	55	28	3 75	94	100	34	3 00	3 75
Clarion,	1 15	62	30	47	40	20	3 25	78	80	30	2 20	2 75
Clearfield,	1 20	65	31	48	45	21	3 00	85	95	27	2 10	2 80
Clinton,	1 30	75	38	58	41	24	3 25	95	105	26	2 10	2 50
Columbia,	1 25	62	31	50	41	20	4 50	87	87	30	2 90	3 25
Crawford.												
Cumberland,	1 32	78	35	50	54	20	4 10	100	105	28	3 00	3 75
Dauphin,	1 28	65	32	50	45	18	3 75	85	90	26	2 50	2 75
Delaware,	1 37	67	35	50	50	25	4 10	100	100	34	3 00	3 50
Elk,	1 25	78	40	62	50	20	3 25	90	90	25	2 25	2 75
Erie,	1 30	78	31	54	31	20	3 75	70	75	21	2 10	2 75
Fayette,	1 30	72	32	50	45	16	3 75	85	95	27	2 50	2 75
Forest,	1 15	60	30	54	40	22	3 00	90	95	22	2 10	2 75
Franklin,	1 25	80	30	42	40	18	3 00	98	110	25	2 50	3 00
Fulton,	1 30	60	30	50	35	12	3 75	85	90	20	2 50	3 10
Greene,	1 28	55	31	48	45	20	3 00	90	95	22	2 75	3 75
Huntingdon,	1 25	80	30	49	40	18	3 25	80	85	23	3 00	3 50
Indiana,	1 30	62	34	50	41	20	3 25	90	95	27	2 87	3 12
Jefferson,	1 25	67	30	47	40	15	3 00	80	87	25	2 10	2 50
Juniata,	1 30	78	32	50	38	17	4 00	85	92	26	3 00	3 50
Lackawana,	1 28	70	30	48	32	16	3 25	90	90	24	2 87	3 25
Lancaster,	1 30	65	38	50	48	20	4 00	80	85	38	3 10	3 50
Lawrence,	1 28	60	31	48	40	18	3 75	78	85	26	2 70	3 10
Lebanon,	1 30	65	37	49	32	17	3 80	95	85	24	2 75	3 25
Lehigh,	1 35	75	38	55	50	23	3 75	100	100	32	2 80	3 40
Luzerne,	1 30	78	37	50	42	18	3 87	75	85	26	2 10	2 75
Lycoming,	1 25	75	35	48	34	19	3 10	85	95	27	2 50	3 00
McKean,	1 20	60	30	43	37	15	3 20	80	85	24	2 20	3 00
Mercer,	1 25	72	31	45	40	15	3 75	105	105	21	3 00	3 75
Mifflin,	1 26	65	32	48	41	16	3 50	87	87	22	2 75	3 10
Monroe,	1 32	70	35	60	42	16	3 50	90	100	25	2 75	3 25
Montgomery,	1 38	75	40	60	65	28	4 25	100	100	37	3 00	3 75
Montour,	1 27	75	30	50	35	18	3 20	75	85	24	2 25	3 00
Northampton,	1 30	75	32	50	44	19	3 75	90	95	26	2 25	2 75
Northumberland,	1 32	78	35	54	41	20	4 00	100	105	30	2 75	3 00
Perry,	1 20	55	32	50	40	17	3 25	95	95	27	3 10	3 50
Philadelphia,	1 45	78	40	58	55	28	4 75	125	130	40	4 00	4 75
Pike,	1 45	75	40	60	40	19	3 90	95	95	25	3 00	3 75
Potter,	1 45	85	31	48	32	20	4 00	98	105	21		
Schuylkill,	1 42	85	40	70	50	25	. . .	. . .	100	23		
Snyder,	1 32	75	30	50	40	13	3 75	75	85	22	3 75	3 00
Somerset,	1 28	75	32	60	35	16	3 25	98	105	25	2 25	3 00
Sullivan,	1 35	75	34	55	40	18	4 00	100	100	22	3 00	3 25
Susquehanna,	1 42	78	34	50	38	21	3 75	90	95	26	2 80	3 40
Tioga,	1 38	75	32	48	37	18	3 80	90	92	24	2 75	3 25
Union,	1 31	85	32	50	41	18	. . .	. . .	78	22		
Venango,	1 30	70	30	52	38	18	3 75	95	100	24	2 80	3 10
Warren,	1 31	75	32	50	38	14	3 87	90	95	25	2 90	3 25
Washington,	1 30	80	31	50	42	20	3 75	90	90	35	3 75	3 75
Wayne,	1 36	70	32	51	40	18	3 87	92	95	23	3 00	3 25
Westmoreland,	1 26	65	33	43	36	20	4 87	110	115	30	3 25	3 50
Wyoming,	1 27	66	32	48	38	15	3 75	100	100	26	2 50	2 00
York,	1 38	67	35	52	38	20	4 25	105	110	28	2 75	3 25

FARM WAGES AND BOARD—1878.

FROM RETURNS OF OFFICIAL REPORTERS.

COUNTIES.	By the month, (whole year,) with board.	By the month, (summer months,) with board.	By the day, (with board,) regular work.	By the day, (without board,) regular work.	By the month, (whole year,) without board.	By the month, (summer months,) without board.	Estimated cost of board per day.
Adams,	$10 00	$12 50	$0 60	$0 95	$19 50	$22 50	$0 27
Allegheny,	11 50	15 00	75	95	21 50	30 00	36
Armstrong,	12 50	15 00	75	95	20 00	25 00	32
Beaver,	10 75	14 50	75	1 00	17 50	22 00	35
Bedford,	10 00	13 25	60	65	13 00	15 50	36
Berks,	10 00	12 50	80	75	16 50	20 00	32
Blair,	10 00	13 00	55	87	19 00	22 00	35
Bradford,	11 75	14 50	65	90	17 50	22 50	30
Bucks,	12 50	15 00	75	1 15	20 00	23 50	33
Butler,	8 00	10 00	1 00	1 40	18 00	22 00	35
Cambria,	8 50	12 00	50	75	10 75	16 00	28
Cameron,	14 00	18 00	75	1 10	24 00	28 00	30
Carbon,	10 00	12 00	60	90	22 00	26 50	32
Centre,	10 50	12 50	62	85	16 50	20 00	36
Chester,	14 00	16 50	65	95	22 00	25 00	33
Clarion,	. . . . .	. . . . .	62	87	. . . . .	. . . .	35
Clearfield,	12 00	15 00	75	95	18 00	20 50	33
Clinton,	12 75	15 00	62	87	18 00	20 75	32
Columbia,	10 00	13 50	60	87	18 00	20 00	37
Crawford,	12 75	15 50	75	1 10	25 00	30 00	35
Cumberland,	13 00	15 00	62	90	20 00	25 00	33
Dauphin,	12 00	15 00	60	75	18 00	20 00	35
Delaware,	12 75	15 00	75	1 00	18 50	21 50	40
Elk,	14 00	16 75	75	1 10	22 00	25 25	35
Erie,	13 50	15 75	75	1 05	19 50	23 50	35
Fayette,	10 00	12 50	75	1 00	. . . . .	. . . . .	32
Forest,	15 00	18 50	75	1 25	29 80	32 50	35
Franklin,	11 00	14 25	70	1 00	18 25	21 75	30
Fulton,	10 50	12 75	60	95	18 00	21 50	32
Greene,	11 75	14 25	75	1 00	17 50	20 00	32
Huntingdon,	11 50	14 25	62	85	14 50	18 00	34
Indiana,	11 00	12 75	62	95	17 25	20 00	36
Jefferson,	11 75	13 75	62	87	15 50	20 75	34
Juniata,	11 50	13 75	60	75	15 25	23 00	30
Lancaster,	12 25	15 50	70	95	15 60	20 00	37
Lawrence,	10 00	15 00	75	1 10	21 00	24 50	40
Lebanon,	8 00	11 50	65	88	13 50	16 75	30
Lehigh,	9 75	12 00	70	95	17 50	23 75	35
Luzerne,	12 50	15 00	65	1 00	21 50	25 50	37
Lycoming,	14 50	18 25	70	1 00	20 00	24 50	34
McKean,	15 00	19 00	1 00	1 30	24 00	27 50	40
Mercer,	9 75	16 00	75	1 10	13 50	20 00	36
Mifflin,	10 00	13 25	75	1 00	. . . . .	. . . . .	34
Monroe,	10 00	12 25	55	87	. . . . .	. . . .	37
Montgomery,	12 50	15 50	75	1 12	20 00	24 00	30
Montour,	10 00	12 50	62	95	18 00	22 00	34
Northampton,	8 50	10 75	75	1 00	. . . . .	. . . . .	32
Northumberland,	10 00	12 50	62	87	15 00	18 75	31
Perry,	10 00	12 25	55	80	14 00	16 50	30
Philadelphia,	15 00	18 50	87	1 12	24 00	27 50	43
Pike,	11 00	13 00	60	1 00	18 00	21 50	36
Potter,	12 75	16 00	75	1 00	24 25	27 00	33
Schuylkill,	12 00	16 00	68	1 00	22 00	25 25	35
Snyder,	12 00	16 00	50	75	20 00	23 75	34
Somerset,	10 50	13 25	65	95	. . . . .	. . . . .	30
Sullivan,	10 00	13 00	60	87	19 00	23 50	35
Susquehanna,	10 50	13 75	75	1 00	20 00	23 75	35
Tioga,	12 50	15 25	85	1 15	20 00	25 50	35
Union,	12 25	14 75	62	85	18 50	21 25	34
Venango,	12 00	15 00	75	1 00	18 00	22 50	36
Warren,	10 00	14 00	75	1 00	13 75	20 00	36
Washington,	12 50	16 25	70	95	20 00	23 50	35
Wayne,	12 00	15 25	75	1 00	15 00	18 50	32
Westmoreland,	11 50	14 25	65	90	21 00	24 50	35
Wyoming,	12 00	14 75	75	1 00	22 50	26 00	33
York,	12 00	15 75	75	1 05	20 00	24 00	37
Average,	$11 24	$14 05	$0 70	$0 95	$18 41	$24 07	$0 33

FARM WAGES AND BOARD—1879.

FROM RETURNS OF OFFICIAL REPORTERS.

COUNTIES.	By the month, (whole year,) with board.	By the month, (summer months,) with board.	By the day, (with board,) regular work.	By the day, (without board,) regular work.	By the month, (whole year,) without board	By the month, (summer months,) without board.	Estimated cost of board per day.
Adams,	$8 00	$11 00	$0 65	$1 00	$16 00	$20 00	$0 30
Allegheny,	12 50	16 50	90	1 10	20 00	25 00	40
Armstrong,	11 00	13 00	63	89	18 50	20 50	28
Beaver,	13 00	15 50	68	90	18 75	22 50	30
Bedford,	8 75	11 50	50	75	11 75	18 75	30
Berks,	9 00	13 00	50	70	16 50	19 50	23
Blair,	10 50	12 00	50	80	18 00	20 00	33
Bradford,	12 50	14 00	55	75	18 00	20 00	27
Bucks,	13 00	15 50	62	1 00	21 00	23 00	40
Butler,	10 50	13 00	50	1 00	13 00	22 00	40
Cambria,	10 00	12 00	50	75	20 00	25 00	38
Cameron,	12 00	15 00	65	1 00	20 00	26 00	45
Carbon,	9 00	11 00	50	90	. . . . .	. . . . .	40
Centre,	10 00	11 75	50	75	15 00	18 00	30
Chester,	11 75	15 00	58	78	20 00	24 00	38
Clarion,	10 00	14 00	75	1 00	18 00	20 00	32
Clearfield,	10 50	15 00	72	95	. . . . .	. . . . .	34
Clinton,	12 25	16 50	65	90	18 00	23 25	37
Columbia,	10 00	12 00	60	90	16 75	20 00	33
Crawford,	11 00	12 75	62	87	14 00	16 00	37
Cumberland,	9 25	11 00	50	77	16 00	18 50	35
Dauphin,	9 00	11 50	55	1 00	21 00	26 00	23
Delaware,	12 00	15 50	68	95	20 00	23 00	30
Elk,	14 00	16 00	62	1 05	23 00	26 00	42
Erie,	11 50	13 75	75	1 00	20 00	23 50	33
Fayette,	11 00	13 50	62	87	18 00	21 50	25
Forest,	12 50	15 50	65	1 05	21 50	24 50	32
Franklin,	10 00	12 50	62	87	13 50	16 50	25
Fulton,	9 50	12 00	55	82	15 50	18 00	28
Greene,	10 00	13 50	62	87	14 00	18 00	33
Huntingdon,	9 75	11 50	60	87	16 50	18 00	27
Indiana,	9 75	11 50	62	87	14 75	17 50	34
Jefferson,	11 00	15 50	65	1 00	15 50	21 50	28
Juniata,	11 00	14 50	50	87	. . . . .	. . . . .	38
Lackawanna,	11 00	13 75	75	1 00	20 00	25 00	32
Lancaster,	10 50	13 00	62	85	15 00	18 50	22
Lawrence,	12 20	14 50	68	85	16 50	20 00	31
Lebanon,	9 00	11 25	60	85	16 00	20 50	28
Lehigh,	8 00	11 00	50	75	. . . . .	. . . . .	28
Luzerne,	10 00	13 50	53	80	18 50	21 50	32
Lycoming,	11 50	13 00	65	87	16 50	19 00	28
McKean,	11 75	14 75	75	1 00	20 00	24 50	32
Mercer,	10 75	13 00	55	80	18 00	22 00	27
Mifflin,	9 50	11 25	60	89	13 00	18 00	27
Montgomery,	11 50	14 00	60	87	. . . . .	. . . . .	26
Montgomery,	11 00	15 00	87	1 00	19 25	22 00	40
Montour,	9 00	12 50	50	73	15 00	19 00	24
Northampton,	9 25	11 50	60	90	18 50	22 00	25
Northumberland,	9 50	11 00	50	90	17 25	20 00	38
Perry,	9 50	11 00	50	80	16 00	18 50	28
Philadelphia,	12 00	15 00	75	1 05	20 00	24 00	40
Pike,	10 00	13 00	57	89	18 50	22 00	40
Potter,	13 50	16 75	87	1 05	. . . . .	20 00	37
Schuylkill,	9 00	13 50	50	90	18 00	22 00	40
Snyder,	9 00	12 00	50	70	14 00	17 50	27
Somerset,	11 00	14 00	70	87	16 00	. . . . .	37
Sullivan,	11 00	14 00	75	1 04	16 00	20 00	35
Susquehanna,	11 00	13 50	64	90	16 25	20 85	24
Tioga,	11 50	14 25	75	1 00	. . . . .	. . . .	38
Union,	10 00	11 00	50	75	. . . . .	. . . . .	26
Venango,	10 00	13 75	75	90	16 50	18 75	30
Warren,	11 00	15 00	73	1 00	16 00	20 00	32
Washington,	10 25	13 50	60	90	17 00	21 00	31
Wayne,	11 00	12 25	75	1 00	15 00	18 50	34
Westmoreland,	10 25	12 25	50	70	16 50	17 75	32
Wyoming,	9 50	11 75	60	85	17 00	19 50	33
York,	10 25	11 75	73	95	17 75	19 75	30
Average,	$10 56	$13 40	$0 63	$0 86	$17 44	$21 25	$0 32

PER CENT. OF YIELD OF CROPS NAMED, COMPARED WITH LAST YEAR.

FROM NOVEMBER RETURNS OF OFFICIAL REPORTERS.

COUNTIES.	Wheat.	Rye.	Barley.	Oats.	Corn.	Potatoes.	Hay.	Straw.	Tobacco.	Garden products.	Apples.	Peaches.	Pears.	Plums.	Grapes.	Berries.
Adams,	90	95	. .	108	80	102	75	73	85	90	63	120	125	85	90	95
Allegheny,	101	100	100	80	93	105	70	75	100	90	65	50	107	40	95	75
Armstrong,	85	105	. .	100	111	115	75	73	. .	100	130	125	120	100	110	110
Beaver,	98	100	94	82	97	90	80	80	. .	89	75	70	85	50	100	100
Bedford,	80	100	85	95	101	110	65	70	100	102	115	100	102	100	104	102
Berks,	102	95	90	85	105	95	85	85	87	94	75	100	111	100	105	100
Blair,	58	75	75	62	110	111	54	54	. .	90	115	110	105	100	110	95
Bradford,	90	98	93	115	74	125	89	90	100	100	70	100	83	90	75	90
Bucks,	90	93	. .	110	98	83	78	77	110	102	84	98	111	90	100	102
Butler,	55	75	. .	90	90	90	53	70	. .	100	50	25	80	75	100	110
Cambria,	90	75	. .	95	82	75	63	65	. .	95	100	100	93	73	100	100
Cameron,	83	80	. .	90	87	100	75	70	. .	90	80	85	93	. . .	100	100
Carbon,	110	85	. .	95	105	100	85	90	. .	100	110	105	115	100	105	100
Centre,	55	85	85	70	101	110	60	70	102	100	120	125	115	110	110	102
Chester,	95	100	. .	115	100	95	90	92	111	95	75	55	105	104	105	98
Clarion,	67	94	. .	82	104	110	74	87	. .	100	100	87	83	75	100	100
Clearfield,	100	100	90	87	98	110	85	90	107	105	150	120	115	100	111	100
Clinton,	65	75	75	63	115	175	60	91	100	100	63	115	125	95	175	100
Columbia,	100	85	. .	78	90	110	70	87	. .	. . .	100	90	92	100	105	100
Crawford,	104	90	85	104	100	111	82	85	100	110	101	105	110	100	110	105
Cumberland,	75	82	80	75	70	80	70	72	107	100	83	120	95	75	110	90
Dauphin,	72	75	. .	90	114	120	70	68	107	100	75	115	110	75	111	110
Delaware,	87	90	. .	110	95	105	90	95	. .	104	45	50	90	15	75	100
Elk,	93	100	. .	100	95	120	115	93	100	100	150	150	200	105	120	115
Erie,	70	82	100	90	92	125	79	85	. .	102	70	85	150	75	107	80
Fayette,	95	98	97	91	87	97	72	80	100	100	47	100	95	73	100	100
Forest,	94	90	.	69	79	112	92	90	100	98	200	170	175	120	100	150
Franklin,	90	93	90	92	107	110	101	98	104	100	111	130	115	87	103	112
Fulton,	70	74	. .	100	110	120	75	85	. .	103	145	130	125	110	112	140
Greene,	97	98	90	100	100	89	72	91	. .	100	80	85	73	52	100	101
Huntingdon,	87	93	87	100	182	117	75	78	100	110	150	125	115	87	150	110
Indiana,	108	183	. .	102	110	102	85	85	112	100	120	115	108	100	110	100
Jefferson,	100	100	. .	70	100	120	69	90	. .	100	75	98	100	100	95	98
Juniata,	93	90	73	90	91	95	85	87	90	97	90	92	100	100	110	100
Lackawanna,	98	100	. .	94	67	102	84	87	. .	100	75	83	90	. . .	102	104
Lancaster,	90	80	100	97	104	100	81	80	110	100	48	75	73	83	90	86
Lawrence,	92	97	. .	91	103	104	75	78	. .	93	50	75	95	. . .	100	100
Lebanon,	90	75	. .	100	112	100	85	85	100	100	87	100	120	100	115	97
Lehigh,	104	85	. .	102	101	103	90	92	98	97	82	104	107	100	113	97
Luzerne,	99	87	. .	75	90	102	67	78	. .	100	110	. . .	122	127	175	110
Lycoming,	99	97	. .	100	110	120	87	97	. .	100	80	112	102	100	104	102
McKean,	92	97	. .	98	102	110	80	85	. .	100	75	78	92	80	102	104
Mercer,	104	100	. .	94	97	104	75	85	. .	100	92	100	100	100	90	100
Mifflin,	84	104	. .	92	112	110	78	70	. .	104	90	175	110	150	123	92
Monroe,	100	90	. .	87	92	90	70	72	. .	100	100	102	107	90	104	100
Montgomery,	99	95	. .	107	100	104	95	97	. .	102	96	120	122	104	105	97
Montour,	101	102	. .	98	100	114	76	89	104	100	57	160	120	180	97	100
Northampton,	94	92	. .	100	102	104	85	96	110	100	45	75	100	80	85	100
Northumberland	87	92	. .	79	100	162	65	75	. .	100	54	170	104	100	102	104
Perry,	93	90	. .	97	120	107	90	90	92	97	110	150	110	112	120	104
Philadelphia,	100	100	. .	107	102	108	80	100	. .	100	95	100	114	. .	100	87
Pike,	97	57	80	97	87	102	92	95	97	100	111	104	120	110	110	120
Potter,	98	100	100	110	90	120	101	100	100	103	175	98	114	103	105	112
Schuylkill,	98	90	. .	75	104	87	48	89	. .	100	75	90	102	87	110	100
Snyder,	86	90	. .	87	110	100	86	89	84	90	20	111	95	90	112	97
Somerset,	99	89	105	100	102	115	74	87	. .	103	147	142	137	113	127	123
Sullivan,	97	85	87	102	87	115	73	70	. .	93	120	75	87	100	87	78
Susquehanna,	93	97	. .	110	74	128	100	100	. .	100	114	102	105	87	82	101
Tioga,	98	92	. .	101	97	110	82	79	. .	100	102	100	107	. . .	87	100
Union,	112	95	. .	87	113	93	70	90	111	105	120	175	120	150	90	110
Venango,	92	110	100	85	94	67	75	70	. .	92	101	140	115	100	124	102
Warren,	98	95	101	105	90	117	85	100	. .	111	170	117	200	75	100	92
Washington,	107	102	102	97	93	72	87	101	. .	97	71	37	76	48	87	78
Wayne,	93	95	100	112	83	117	104	103	. .	100	77	73	104	28	82	84
Westmoreland,	99	92	97	78	98	104	67	72	100	100	102	87	97	102	118	100
Wyoming,	100	93	. .	92	98	115	97	89	102	100	74	104	92	81	102	94
York.																

PER CENT. OF YIELD OF CROPS NAMED, COMPARED WITH AVERAGE OF LAST TEN YEARS.

FROM RETURNS OF OFFICIAL REPORTERS.

	Wheat.	Rye.	Barley.	Oats.	Corn.	Potatoes.	Hay.	Straw.	Tobacco.	Garden products.	Apples.	Peaches.	Pears.	Plums.	Grapes.	Berries.
Adams,	89	90	. . .	75	85	97	93	75	. . .	98	75	92	92	. .	93	98
Allegheny,	102	97	100	89	100	92	67	75	100	90	90	89	75	. .	100	100
Armstrong,	94	97	. . .	92	100	102	70	80	. . .	100	102	104	101	100	102	100
Beaver,	95	97	93	85	87	102	85	80	. . .	104	102	97	100	100	104	100
Bedford,	87	90	. . .	92	104	102	82	87	. . .	100	110	115	107	97	102	100
Berks,	93	87	. . .	96	87	92	87	90	107	101	90	87	94	100	102	104
Blair,	85	87	100	104	102	82	87	91	. . .	100	80	82	87	92	97	87
Bradford,	78	90	97	102	90	98	85	67	100	100	67	75	100	100	92	98
Bucks,	103	100	. . .	104	100	97	90	97	. . .	92	87	97	92	87	100	100
Butler,	87	83	. . .	89	97	100	87	85	. . .	100	65	78	82	97	102	104
Cambria,	85	84	. . .	90	92	100	89	97	. . .	100	75	87	92	87	100	100
Cameron,	96	86	. . .	97	100	100	82	87	. . .	100	52	54	97	87	102	104
Carbon,	100	100	. . .	107	102	100	87	92	. . .	87	104	106	100	100	87	98
Centre,	85	92	100	67	101	102	83	75	. . .	100	103	107	106	102	104	100
Chester,	103	100	. . .	110	100	107	92	93	. . .	87	70	82	104	100	100	100
Clarion,	67	89	. . .	97	100	100	82	87	. . .	100	100	100	100	92	87	100
Clearfield,	102	100	. . .	67	67	100	84	89	. . .	102	111	117	110	90	104	108
Clinton,	81	75	100	82	112	120	74	70	140	100	70	112	138	94	137	100
Columbia,	93	87	. . .	85	97	92	110	78	. . .	100	87	85	85	85	95	97
Crawford,	110	95	110	97	100	118	92	93	90	97	105	103	100	100	97	100
Cumberland,	95	90	92	102	76	89	92	97	. . .	95	90	120	100	100	112	106
Dauphin,	87	78	. .	87	100	102	72	78	. . .	87	67	72	89	97	100	102
Delaware,	83	95	. . .	107	97	108	102	90	. . .	100	72	. .	87	92	75	100
Elk,	110	100	. . .	115	94	112	110	111	. . .	107	200	150	175	100	100	96
Erie,	96	99	. . .	100	100	107	92	98	. . .	104	87	100	89	92	102	99
Fayette,	100	100	. . .	96	100	97	82	85	. . .	100	72	78	86	97	100	100
Forest,	100	100	. . .	92	97	95	87	89	. . .	100	75	100	87	96	98	92
Franklin,	97	97	. . .	89	97	100	91	97	. . .	92	110	115	102	107	102	104
Fulton,	89	97	. . .	92	100	100	97	98	. . .	100	126	125	107	104	107	100
Greene,	115	100	100	100	100	110	78	96	. . .	100	40	100	100	100	89	96
Huntingdon,	89	85	92	100	111	114	100	97	. . .	100	110	107	104	93	100	92
Indiana,	112	114	. . .	90	100	113	93	95	. . .	111	110	120	112	100	113	100
Jefferson,	97	99	. . .	100	100	104	100	100	. . .	100	140	100	100	102	104	100
Juniata,	100	100	. . .	97	97	107	93	97	90	100	77	100	87	75	110	104
Lackawanna																
Lancaster,	100	93	. . .	100	98	97	80	87	100	100	60	59	60	75	87	94
Lawrence,	92	97	. . .	100	97	107	100	92	. . .	100	75	78	86	94	100	100
Lebanon,	100	90	. . .	105	110	111	97	97	100	100	87	100	115	100	110	100
Lehigh,	93	98	. . .	94	100	96	98	87	. . .	102	67	74	90	100	100	112
Luzerne,	100	75	. . .	98	89	120	100	100	. . .	97	100	100	117	110	130	140
Lycoming,	89	92	. . .	100	100	97	89	91	. . .	100	72	87	85	72	104	102
McKean,	97	93	. . .	100	102	104	90	97	. . .	100	75	78	89	90	100	90
Mercer,	100	96	. . .	95	98	107	85	92	. . .	100	78	87	105	95	93	115
Mifflin,	89	104	. . .	100	100	104	78	85	. . .	107	92	120	105	102	100	100
Monroe,	80	90	. . .	78	75	100	70	78	. . .	94	90	70	100	100	100	100
Montgomery,	102	100	. . .	95	107	109	97	98	. . .	105	100	100	105	97	110	107
Montour,	100	100	. . .	92	97	100	92	94	. . .	100	75	89	97	100	100	97
Northampton,	87	89	. . .	100	100	100	75	70	107	100	87	49	100	100	75	100
Northumberland	100	100	. . .	90	100	117	78	100	. . .	100	75	101	110	100	100	100
Perry,	97	93	. . .	90	110	95	92	94	97	93	107	120	107	104	108	97
Philadelphia,	100	100	. .	97	98	111	97	100	. . .	100	78	87	92	. .	75	97
Pike,	98	100	. . .	97	100	87	90	93	95	100	100	100	90	97	100	104
Potter,	110	115	103	100	100	111	100	100	. . .	100	130	93	112	117	100	100
Schuylkill,	100	90	. . .	90	100	97	75	87	. . .	100	75	87	100	100	107	100
Snyder,	100	97	. . .	80	110	103	90	95	80	96	30	95	97	100	110	98
Somerset,	105	90	100	95	120	112	90	100	. . .	110	125	120	140	100	100	97
Sullivan,	87	93	92	100	92	102	80	90	. . .	92	105	95	90	100	90	98
Susquehanna,	100	101	. . .	110	87	102	100	100	. .	97	100	100	100	75	89	98
Tioga,	104	100	. . .	100	110	107	97	95	. . .	100	75	80	97	100	100	92
Union,	92	93	. . .	80	105	110	87	92	. . .	105	75	78	92	98	97	100
Venango,	100	100	. . .	97	102	107	92	93	. . .	100	100	100	75	97	100	104
Warren,	100	107	. . .	110	89	105	90	100	. . .	114	140	100	175	72	100	95
Washington,	120	110	. . .	100	100	100	87	92	. . .	100	75	87	72	75	80	92
Wayne,	102	105	97	100	100	104	107	100	. . .	97	107	100	100	90	97	104
Westmoreland,	107	105	93	100	93	97	75	89	. . .	100	97	100	97	98	100	100
Wyoming,	100	93	. . .	100	97	97	69	92	. . .	97	100	100	75	92	100	98
York,	108	92	. . .	105	105	93	100	100	100	111	83	89	100	92	100	100

LIST OF COUNTY AGRICULTURAL SOCIETIES,

CORPORATE OR OFFICIAL TITLE.	President.	Secretary.
1. Armstrong County Agricultural Society,		R. L. Brown,
2. *Adams County Agricultural Society,	William Urbble,	E. G. Fahnestock,
3. *Beaver County Agricultural Society,	Dr. D. McKinney, jr.,	John Gearing, jr.,
4. *Bradford County Agricultural Society,	J. E. Piolette,	W. S. Vincent,
5. Bradford county, (Troy Farmers' Club,)	A. H. Thomas,	G. M. Card,
6. Bucks County Agricultural Society,	R. K. Tomlinson,	Robert Eastburn,
7. *Bucks county, (Doylestown Agricultural and Mechanical Institute,)	Dr. I. Michemer,	N. C. James,
8. *Berks County Agricultural Society,	J. G. Zerr,	C. T. Fox,
9. Berks county, (Keystone Agricultural and Horticultural Society,)	George J. Kutz,	W. B. Bieber,
10. Bedford County Agricultural Society,	Dr. E. J. Miller,	H. O. Kline,
11. Butler County Agricultural Society,		J. C. Campbell,
12. *Butler county, (Connoquenessing Valley Agricultural Society,)	I. Stauffer,	L. Reed,
13. *Blair County Agricultural Society,*		F. Jakel,
14. Cambria county, (Highland Agricultural Society,)		G. T. Swank,
15. Carbon County Industrial Society,	J. C. Kramer,	W. M. Rapsher,
16. *Centre County Agricultural Society,	S. S. Lyon,	W. F. Reeder,
17. *Chester County Agricultural Society,	Evans Rogers,	A. M. Eachus,
18. Chester county, (Oxford Agricultural Society,)	I. Acker,	H. L. Brinton,
19. Chester county, (Brandywine Farmers' Club,)	Job Roberts,	D. H. Branson,
20. Clarion County Agricultural Society and Driving Park Association,	A. W. Corbett,	A. H. Alexander,
21. *Columbia County Agricultural Society,	E. J. McHenry,	M. W. Nuss,
22. *Cumberland County Agricultural Society,	C. H. Mullin,	L. F. Lyne,
23. Clearfield County Agricultural Society,		H. Hoover,
24. Crawford County Agricultural Society,	J. Bolard,	R. B. Myers,
25. Crawford county, (French Creek Valley Agricultural Society,)	Hugh Smith,	W. A. Logan,
26. *Crawford county, (Oil Creek Valley Agricultural Association,)	J. Bramhall,	W. M. Henderson,
27. *Clinton County Agricultural Society,		J. C. Whalley,
28. Clinton county, (Lycoming and Clinton Agricultural Society,)	John S. Tomb,	D. A. Bingman,
29. Dauphin County Agricultural Society,	Isaac Mumma,	W. H. H. Sieg,
30. Dauphin county, (Gratz Driving Park Association,)		H. W. Shoffstall,
31. Delaware County Agricultural Society,	J. N. Trainer,	H. C. Snowden,
32. *Erie County Agricultural Society,	J. C. Thornton,	G. Burton,
33. *Franklin County Agricultural Society,		C. Gilbert,
34. Fulton County Agricultural Society,		G. A. Stewart,
35. Greene County Agricultural Society,		J. G. Patterson,
36. Greene county, (Central Fair Association,)	W. T. Lantz,	A. L. Meyers,
37. Greene county, (Rich Hill Agricultural Society,)	W. Jacobs,	J. T. Goodwin,
38. Huntingdon County Agricultural Society,		J. R. Patton,
39. *Indiana County Agricultural Society,	S. M. Clark,	G. E. Smith,
40. *Juniata County Agricultural Society,	Noah Hartzler,	J. P. Wharton,
41. Juniata county, (Riverside Park Association,)		R. McMeen,
42. *Lancaster County Agricultural Society,	Calvin Cooper,	J. F. Whitmer,
43. Lancaster county, (Lancaster Park Association,)		H. R. McCaskey,
44. *Lawrence County Agricultural and Horticultural Society,	D. H. Wallace,	W. T. Butz,
45. Lawrence county, (Harlansburg Agricult'l Associat'n,	J. Humphrey,	W. T. Leathers,
46. Lebanon County Agricultural Society,		I. Hoffer,
47. *Lycoming County Agricultural Society,	S. N. Williams,	J. J. Reardon,
48. *Lehigh County Agricultural Society,	E. Erdman,	L. P. Hecker,
49. *Luzerne County Agricultural Society,	J. B. Smith,	J. D. Greene,
50. Mifflin County Fair Association,		C. S. Marks,
51. Monroe County Agricultural Society,		J. B. Storm,
52. *Montgomery County Agricultural Society,	Dr. M. Newberry,	Joseph Rex,
53. Montgomery county, (Schuylkill Valley Agricultural Association,)		A. M. Scheffly,
54. Montour County Agricultural Society,	E. Sideler,	J. Sweesfoot,
55. Montour county, (Northern Montour County Agricultural Society,)		Dr. Frazer,
56. Mercer County Agricultural Society,	G. W. Potter,	F. A. Bliss,
57. *Mercer county, (Western Pennsylvania Agricultural Society,)	M. W. Alexander,	W. J. McKean,

OFFICERS, &c., FROM OFFICIAL SOURCES.

Address of Secretary.	Date of organization.	Average annual attendance.	Acres enclosed.	Owned or leased.	Value of real estate.	Number of shares.†	Par value of shares.†	Premiums for farm products.	Premiums for household products.	Premiums for farm machinery.	Premiums for stock.	Trials of speed.	Amount of bounty from the county.	
Kittanning, ...	1852	. . . .	15	Owned,	$7,000	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	1
Gettysburg, ...	1852	3,000	30	Owned,	7,500	. . .	. . .	$100	$175	D	$200	$500	$100	2
Beaver, ...	1853	3,000	25	Owned,	18,000	. . .	. . .	. . .	. . .	. . .	500	1,275	100	3
Towanda, ...	1852	5,000	20	Leased,	. . . .	. . .	. . .	150	75	D	575	. . .	100	4
Sylvania, ...	1852	1,000	12	Owned,	. . . .	. . .	. . .	75	50	D	325	. . .	. . .	5
Yardleyville, . . .	1856	. . .	. .	. . . . . .	. . . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	100	6
Doylestown, . . .	1867	20,000	23	Owned,	40,000	2,500	$10	100	1,175	D	1,150	2,200	. . .	7
Reading, ...	1852	7,500	30	Leased,	. . . .	. . .	. . .	283	175	D	680	575	100	8
Kutztown, ...	1870	3,000	20	Leased,	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	9
Bedford, ...	1875	1,500	14	Owned,	7,000	250	20	75	100	$75	450	50	. . .	10
Butler, ...	. . .	1,600	18	Leased,	. . . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	11
Zelienople, ...	1874	3,000	22	Leased,	. . . .	. . .	. . .	175	75	D	800	500	100	12
Hollidaysburg, . .	1873	. . . .	. .	Owned,	. . . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	100	13
Johnstown, ...	1870	2,500	20	Leased,	. . . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	4
Lehighton, ...	1852	4,000	20	Owned,	10,000	500	20	50	100	D40	175	175	. . .	15
Bellefonte, ...	1852	7,000	21	Owned,	10,000	. . .	. . .	D50	200	D	250	58	100	16
West Chester, . . .	1852	15,000	23	Owned,	20,000	1,256	10	200	750	D	1,200	1,450	100	17
Oxford, ...	1870	10,000	28	Owned,	15,000	1,000	10	250	300	D	250	250	. . .	18
Coatesville, ...	1865	500	. .	. . . . . .	. . . .	. . .	. . .	38	50	D	. . .	. . .	. . .	19
Clarion, ...	1874	3,000	17	Leased,	. . . .	. . .	. . .	50	50	D	275	285	. . .	20
Bloomsburg, . . .	1855	4,000	20	Owned,	5,000	. . .	. . .	75	50	D	175	300	100	21
Carlisle, ...	1857	8,000	30	Owned,	12,500	. . .	. . .	75	100	D	650	755	100	22
Clearfield, ...	1852	2,000	15	Leased,	. . . .	. . .	. . .	88	75	50	350	750	. . .	23
Conneautville, . .	1852	10,000	25	Leased,	. . . .	. . .	. . .	200	200	75	1,150	50	25	24
Meadville, ...	1877	5,000	22	Leased,	. . . .	1,400	200	50	85	75	1,500	130	25	25
Titusville, ...	1875	3,000	21	Leased,	. . . .	. . .	. . .	75	150	75	850	30	25	26
Lock Haven, . . .	1874	2,000	. .	. . . . . .	. . . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	100	27
Jersey Shore, . . .	1874	2,500	20	Leased,	. . . .	. . .	. . .	100	200	D	175	400	. . .	28
Harrisburg, ...	1870	5,000	30	Leased,	. . . .	. . .	. . .	D	275	D	1,000	675	. . .	29
Gratz, ...	1873	5,000	20	Leased,	. . . .	. . .	. . .	400	125	175	500	300	. . .	30
Media, ...	1878	8,000	25	Owned,	3,500	. . .	. . .	65	D75	D	200	. . .	. . .	31
Erie, ...	. . .	7,500	20	Owned,	9,500	. . .	. . .	425	100	D125	1,650	150	100	32
Chambersburg, . .	. . .	7,500	. .	. . . . . .	7,000	60	100	. . .	. . .	. . .	. . .	. . .	100	33
Wells Tannery, . .	. . .	. . . .	. .	. . . . . .	. . . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	34
Carmichaels, . . .	1852	1,500	14	Owned,	3,000	. . .	. . .	250	150	50	250	200	. . .	35
Waynesburg, . . .	1870	1,650	7	Owned,	2,000	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	36
Wind Ridge, . . .	1866	4,000	6	Owned,	2,000	300	5	25	70	50	275	60	. . .	37
Huntingdon, . . .	. .	3,000	15	Owned,	. . . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	38
Indiana, ...	1853	10,000	7	Owned,	8,000	. . .	. . .	375	150	100	150	100	100	39
Port Royal, ...	1859	3,000	10	Owned,	3,500	100	5	75	75	25	100	75	100	40
Mifflintown, . . .	. . .	2,000	8	Leased,	. . . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	41
Paradise, ...	. . .	. . . .	. .	. . . . . .	. . . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	33	42
Lancaster, ...	1869	5,000	30	Owned,	10,000	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	43
New Castle, ...	. . .	. . . .	. .	. . . . . .	. . .	500	100	95	150	25	300	1,550	100	44
Harlansburg, . . .	. . .	. . . .	. .	. . . . . .	. . . .	. . .	. . .	50	100	D50	375	250	. . .	45
Lebanon, ...	1862	4,500	28	Owned,	5,500	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	46
Williamsport, .	1855	. . . .		Leased,	. . . .	. . .	. . .	100	250	75	350	555	100	47
Allentown, ...	1851	20,000	40	Leased,	. . . .	724	25	150	250	D50	1,300	275	100	48
Wyoming, ...	1873	3,000	20	Leased,	. . . .	. . .	50	D50	100	D50	250	450	100	49
Lewistown, ...	1870	2,750	12	Leased,	. . . .	. . .	. . .	50	75	D	200	350	. . .	50
Stroudsburg, . . .	1875	1,500	23	Owned,	3,000	1,000	5	75	90	D50	210	350	. . .	51
Upper Dublin, . .	1870	10,000	34	Owned,	30,000	3,400	5	100	450	D25	1,250	1,350	100	52
Pottstown, ...	. . .	. . . .	. .	. . . . . .	. . . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	53
Danville, ...	1870	8,500	50	Owned,	5,000	310	10	. . .	. . .	. . .	. . .	. . .	. . .	54
Washingtonville,	1875	2,500	15	Owned,	. . . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	55
Stoneboro', ...	1866	5,000	35	Owned,	9,000	. . .	. . .	75	75	50	900	130	. . .	56
Mercer, ...	1871	12,000	40	Leased,	. . . .	900	10	140	175	95	1,000	325	100	57

LIST OF COUNTY AGRICULTURAL

CORPORATE OR OFFICIAL TITLE.	President.	Secretary.
58. Mercer county, (Shenango Valley Agricultural Society,)		H. C. Horner,
59. Mercer county, (Jamestown Agricultural Society,		W. Gamble,
60. *Northampton County Agricultural Society,	P. K. Uppinger,	E. T. Greenewald,
61. Northampton county, (Farmers' and Mechanics' Institute,)	E. E. Hemingway,	C. Hilliard,
62. *Northumberland County Agricultural Society,	Joseph Nicely,	G. W. Armstrong,
63. Potter County Agricultural Society,	W. B. Gardiner,	John S. Ross,
64. Philadelphia County Agricultural Society,		C. R. King,
65. *Schuylkill County Agricultural Society,	H. H. Brownmiller,	G. H. Yeager,
66. Schuylkill county, (Ringtown Agricultural Society,)	L. W. Kerbs,	I. Applegate,
67. Snyder county, (Union Agricultural Society,)		M. Wetzel,
68. *Somerset County Agricultural Society,	Valentine Hay,	W. M. Schrockborn,
69. *Susquehanna County Agricultural Society,	W. Jessup,	A. D. Birchard,
70. Sullivan County Agricultural Society,		D. F. Huckell,
71. *Tioga County Agricultural Society,	W. P. Campbell,	J. W. Matisee,
72. *Union County Agricultural Society,	James Biehl,	G. W. Walls,
73. *Wayne County Agricultural Society,		T. J. Haw,
74. Warren County Agricultural Society,	G. D. Martin,	D. B. Jaggee,
75. Washington County Agricultural Society,	J. McDowell,	J. F. Gabby,
76. Washington county, (Union Agricultural Society,)	W. L. Archer,	J. P. Wood,
77. Washington county, (Chartiers Valley Agricultural Society,)		R. V. Johnson,
78. Washington county, (Monongahela Valley Agricultural Society,)	J. Vanvoorhis,	C. W. Hazzard,
79. Westmoreland County Agricultural Society,	T. Donohoe,	H. Kitlering,
80. *York County Agricultural Society,	S. B. Helges,	A. H. Glatz,
81. York county, (Horticultural and Industrial Society,)	W. S. Roland,	F. Geise,

* Represented in the Board.

SOCIETIES, OFFICERS, &c.—CONTINUED.

Address of Secretary.	Date of organization.	Average annual attendance.	Acres enclosed.	Owned or leased.	Value of real estate.	Number of shares.†	Par value of shares.†	Premiums for farm products.	Premiums for household products.	Premiums for farm machinery.	Premiums for stock.	Trials of speed.	Amount of bounty from the county.	
Greenville,	...	10,000	14	Leased,	...	...	...	...	...	...	...	...	...	58
Jamestown,	...	...	10	Leased,	...	...	...	...	...	...	...	...	...	59
Nazareth,	1853	20,000	10	Owned,	$10,000	225	$10	$125	$200	D$50	$300	$225	$100	60
Easton,	1875	12,000	21	Owned,	...	...	...	D100	D84	D17	D250	650	...	61
McEwensville,	1853	3,500	17	Leased,	...	135	5	50	125	D50	175	280	100	62
Coudersport,	...	...	.	...	...	...	...	75	100	45	150	...	...	63
Andalusia,	...	...	...	...	...	...	...	...	...	...	...	...	...	64
Orwigsburg,	1851	2,500	15	Owned,	2,500	...	...	...	...	...	...	...	100	65
Ringtown,	...	2,500	13	Leased,	...	...	...	75	150	D	175	250	...	66
Selinsgrove,	1871	3,000	15	Leased,	...	510	...	100	200	D75	800	450	...	67
Somerset,	1872	...	...	...	...	...	...	150	100	...	100	...	100	68
Montrose,	1864	2,500	20	Owned,	2,000	...	...	...	...	...	...	...	100	69
Forksville,	..	2,000	15	...	...	...	...	...	...	...	...	...	...	70
Wellsboro',	1866	1,500	35	Leased,	...	...	...	...	...	...	...	...	100	71
Lewisburg,	1857	4,000	23	Owned,	8,000	...	...	55	55	75	250	500	100	72
Honesdale,	1862	4,000	35	Leased,	...	950	5	75	105	D	225	800	100	73
Sugar Grove,	1873	8,500	10	Leased,	...	...	...	...	...	...	...	...	...	74
Washington,	1824	3,000	9	Owned,	6,000	125	50	50	150	100	650	150	...	75
Burgettstown,	1855	6,000	17	Leased,	...	...	...	75	250	D50	900	225	...	76
Cannonsburg,	1874	4,500	12	Leased,	...	135	25	100	175	D100	750	250	...	77
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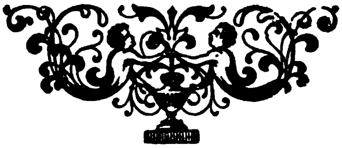
Greensburg,	1871	3,500	...	...	...	...	...	75	25	100	750	400	...	79
York,	1852	12,500	15	Owned,	20,000	...	...	225	325	250	1,450	600	100	80
York,	1879	3,000	...	Leased,	...	...	...	125	225	...	...	...	...	81

† When the number of shares and par value is not given, the society issues no stock but is conducted upon the mutual plan.

D—Diploma.



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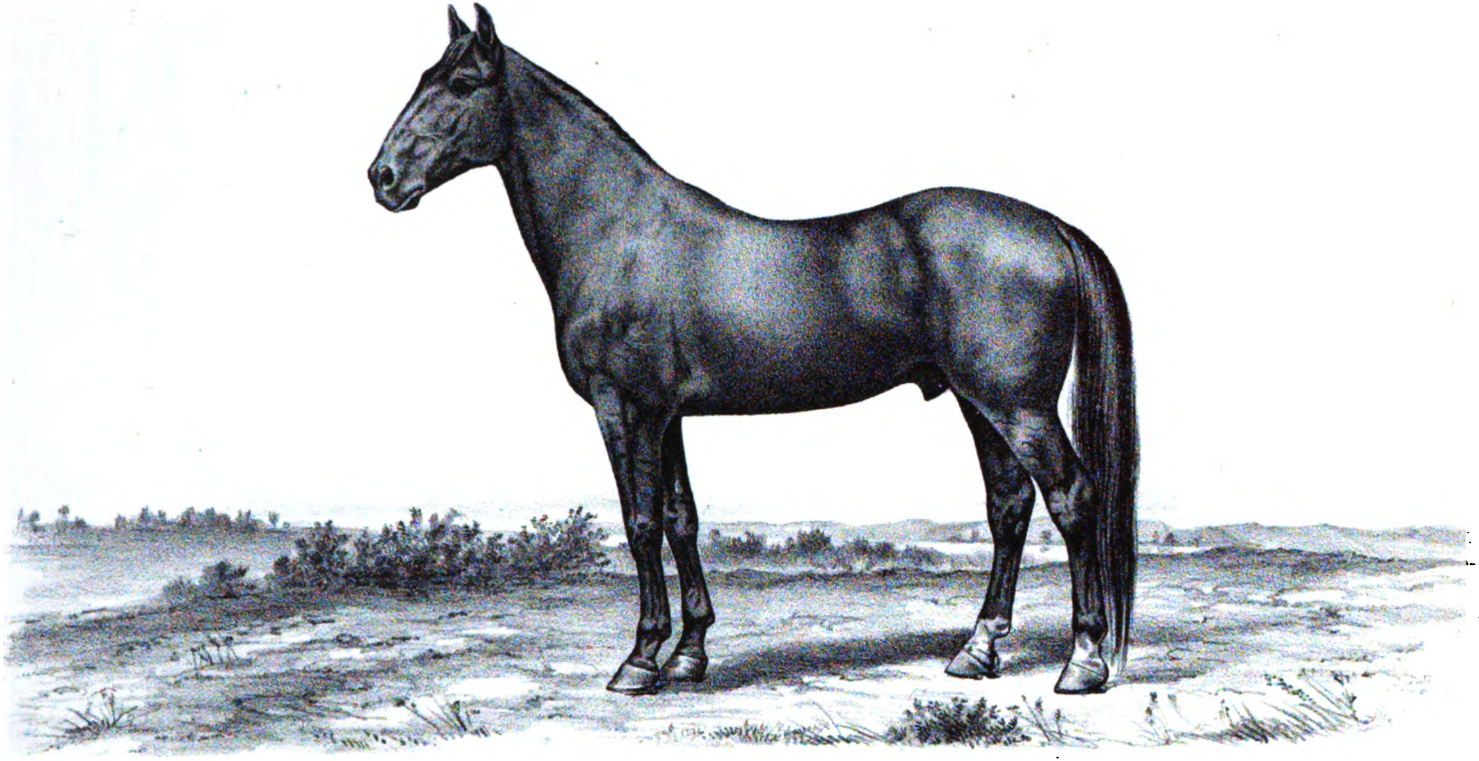


"INKERMAN"

Awarded Grand Sweepstakes Prize - Philadelphia, 1879.

"For best Stallion on Exhibition of any Breed"

Bay, Height 16 Hands, weight 1160 pounds, Sire Speedwell Hambletonian, Dam by Fenimore Trafalgar.

Bred and owned by J. B. Baker, Ingleside, Chester County.

REPORT

OF THE

PENNSYLVANIA STATE AGRICULTURAL SOCIETY.

CONSTITUTION.

THE PENNSYLVANIA STATE AGRICULTURAL SOCIETY was created a "body corporate" by the Legislature, on the 29th day of March, 1851. The act at large can be found in the statutes for 1851, and in previous volumes of the transactions of this society. The society sprung from a meeting held at Harrisburg, on the 21st of January, 1851, in which all the counties of the State were represented. On the 22d, the meeting had taken the form of a society, electing its first president and officers. On the 20th of January, 1852, it held its first annual meeting at Harrisburg, where, in the previous September, its first exhibition had been held, with a good degree of encouragement. Exhibitions have since been held at Lancaster, Pittsburgh, Philadelphia, Harrisburg, Wyoming, Norristown, Williamsport, Easton, Scranton, and Erie, with varying success, but always doing something toward developing the agricultural resources of the State.

The concerns of the society are intrusted to an executive committee, consisting of a president, twenty-seven vice presidents, one from each of the congressional districts into which the State is divided, five additional members, all the ex-presidents, a corresponding and recording secretary, a treasurer, a chemist and geologist, and a librarian, in all, as at present, constituted, a committee of forty-seven.

The constitution has been frequently, but not substantially, amended since its original adoption, in 1852, and now stands as it is given herewith. A list of life members is embodied in this issue. It has been impossible to preserve a necrological register, and, therefore, lapses by death are not noted. The list comprises the names of life members previously to the 1st January, 1878; a total of eight hundred and ten names, representing all parts of the State.

CONSTITUTION OF THE PENNSYLVANIA STATE AGRICULTURAL SOCIETY.

The name of the Society shall be the PENNSYLVANIA STATE AGRICULTURAL SOCIETY. The objects of this Society are to foster and improve agriculture, horticulture, and the domestic and household arts.

Who are Members.

SECTION 1. The Society shall consist of all such persons as shall pay to the Treasurer not less than two dollars, and annually, thereafter, not less than two dollars; and also, of honorary and corresponding members; the names of the members to be recorded by the Secretary.

The officers of county agricultural societies in this State, or delegations therefrom, shall be members *ex officio* of this Society.

The payment of twenty dollars shall constitute life membership, and exempt the members so contributing from all annual payments.

Officers.

SECTION 2. The officers of this Society shall be a president, a vice president from each congressional district, three fourths of whom shall be practical agriculturists or horticulturists, a treasurer, a corresponding secretary, a recording secretary, a librarian, an agricultural chemist and geologist, and such assistants as the society may find essential to the transaction of its business; an executive committee, consisting of the above-named officers, five additional members, with the ex-presidents of the society.

Of the President.

SECTION 3. The President shall have a general superintendence of all the affairs of the Society. In case of the death, illness, or inability of the President to perform the duties of his office, the Executive Committee shall select a Vice President to act in his stead, who shall have the same power and perform the same duties as the president, until the next annual meeting.

Of the Vice Presidents.

It shall be the duty of the Vice Presidents to take charge of the affairs of the association in their several districts; to advance all its objects; to call upon farmers to report as to the condition of agriculture in their neighborhood; to ask for information as to the modes of cultivation adopted by different farmers; and as far as in their power to make known the resources of their districts, the nature of its soil, its geological character, and all such matter as may interest farmers in every part of the State.

Treasurer.

The Treasurer shall keep an account of all moneys paid into his hands, and shall pay bills when audited and approved by the Executive Committee, each order for payment must be signed by the President or chairman of the Executive Committee.

Corresponding Secretary.

The duty of this officer shall be to invite a correspondence with all persons interested in agriculture, whether in the State of Pennsylvania or elsewhere, but especially with our consuls in foreign countries, that new seeds, vegetables, or live stock may be introduced, and their fitness for cultivation and propagation in our climate be tested. At each stated meeting of the Society, he shall read his correspondence, which shall, either the whole, or such parts as may be selected by the Society, form a portion of the transactions. He shall also correspond with the President or other officers of each State society in the United States, at least twice in the year, for purposes of combined and mutual action, and to be informed of the result and progress of each other's efforts; also, to invite mechanics to forward models or implements for examination and trial.

Recording Secretary.

The Recording Secretary shall keep the minutes of the Society and of the Executive Committee. At the close of each year he shall prepare for publication such parts of the minutes and transactions of the Society as may be designated.

Librarian.

The Librarian shall take charge of all books, pamphlets, &c., belonging to the Society, and shall act as curator to preserve seeds, implements, or whatever property the Society may possess.

Executive Committee and Quorum.

The Executive Committee shall transact the business of the Society generally; shall superintend and direct the publication of such of the reports and transactions as they may deem proper, and shall designate the time and places for annual exhibitions, regulate the expenditures, examine all accounts, and keep such general charge of the affairs of the Society as may best promote its interests.

They shall select their own chairman, and meet quarterly, and at any other time when convened by the President; five members shall form a quorum.

The shall call special meetings of the society when necessary.

Annual Meeting of the Society and Quorum.

SECTION 4. The Society shall meet annually, on the third Wednesday of January, at Harrisburg, when all the officers of the Society, not otherwise appointed, shall be elected by ballot for the ensuing year, and until another election. They shall also hold a general meeting at the time of the annual exhibition, and special meetings whenever convoked by the Executive Committee.

Fifteen members shall form a quorum for the transaction of business, but no member in arrears shall be entitled to the privileges of the Society.

Qualifications of Voters.

SECTION 5. No annual member, hereafter, shall be entitled to vote for the election of officers of the Pennsylvania State Agricultural Society, unless he shall have been a member at the previous State fair, and in default of a State fair, then three months previous membership shall be necessary.

SECTION 6. No one shall be eligible to office hereafter who has not obtained a right to vote under section five.

Alteration.

SECTION 7. This constitution may be altered or amended at the annual meetings in January, by a vote of two thirds of the members in attendance.

OFFICERS FOR 1879.

PRESIDENT,

WILLIAM S. BISSELL, *Pittsburgh.*

VICE PRESIDENTS,

1. Archibald R. Montgomery, Bryn Mawr.
2. George Blight, Philadelphia.
3. Alfred L. Kennedy, Philadelphia.
4. W. H. G. Adney, Washington.
5. A. D. Levering, Philadelphia.
6. David H. Branson, Coatesville, Chester county.
7. William H. Holstein, Bridgeport, Montgomery county.
8. Tobias Barto, Reading, Berks county.
9. S. S. Spencer, Lancaster, Lancaster county.
10. Daniel H. Neiman, Easton, Northampton county.
11. D. J. Waller, Bloomsburg, Montour county.
12. Ira Tripp, Scranton, Luzerne county.
13. J. S. Keller, Orwigsburg, Schuylkill county.
14. John A. Smull, Harrisburg, Dauphin county.
15. James E. Carmalt, Montrose, Susquehanna county.
16. F. A. Allen, Mansfield, Tioga county.
17. John A. Lemon, Hollidaysburg, Blair county.
18. John S. Miller, Huntingdon, Huntingdon county.
19. Daniel O. Gehr, Chambersburg, Franklin county.
20. L. A. Mackey, Lock Haven, Clinton county.
21. George Rhey, Millwood, Westmoreland county.
22. John Murdoch, junior, Pittsburgh, Allegheny county.
23. W. W. Speer, Pittsburgh, Allegheny county.
24. John McDowell, Washington, Washington county.
25. J. B. Lawson, Reimersburg, Clarion county.
26. J. D. Kirkpatrick, North Liberty, Mercer county.
27. S. E. Kincaid, Wattsburg, Erie county.

ADDITIONAL MEMBERS EXECUTIVE COMMITTEE.

A. Wilhelm, Cornwall, Lebanon county.

Abner Rutherford, Paxton, Dauphin county.

William Taylor, Womelsdorf, Berks county.

W. B. Culver, Scranton, Luzerne county.

John H. Ziegler, Harrisburg, Dauphin county.

EX-PRESIDENTS MEMBERS OF THE BOARD.

Frederick Watts, Carlisle, Cumberland county.

D. Taggart, Northumberland, Northumberland county.

Jacob S. Haldeman, Harrisburg, Dauphin county.

A. Boyd Hamilton, Harrisburg, Dauphin county.

Amos E. Kapp, Northumberland, Northumberland county.

John C. Morris, Friendsville, Susquehanna county.

J. R. Eby, Harrisburg, Dauphin county.

Recording Secretary—D. W. Seiler, Harrisburg, Dauphin county.

Corresponding Secretary—Elbridge McConkey, Harrisburg, Dauphin county.

Treasurer—John B. Rutherford, Harrisburg, Dauphin county.

Librarian—William H. Egle, Harrisburg, Dauphin county.

Chemist and Geologist—S. S. Haldeman, Columbia, Lancaster county.

Assistant Chemist and Geologist—Hugh Hamilton, Harrisburg, Dauphin county.

COMMITTEE OF ARRANGEMENT.

William S. Bissell, *President*, Allegheny county.

John C. Morris, *Ex-President*, Susquehanna county.
Alfred L. Kennedy, *Vice Pres't*, Philadelphia.
D. W. Seiler, *Recording Sec'y*, Harrisburg.
William H. Egle, *Librarian*, Harrisburg.

Elbridge McConkey, *Corresponding Secretary*, Harrisburg.

LOCAL COMMITTEES OF CO-OPERATION.

Appointed by the Pennsylvania State Dairymen's Association.

A. M. Fuller, Meadville.
H. Cooley Green, Meadville.
L. C. Magaw, Meadville.
M. H. Terry, Waterford.
S. A. Farrington, Cambridgeboro.

Appointed by the Philadelphia Society for Promoting Agriculture.

Alfred L. Elwyn, M. D., *Ch'n*, Phil'a.
John S. Haines, Germantown.
George Blight, Philadelphia.
L. Henry Twaddell, M. D., West Phil'a.
Alfred L. Kennedy, M. D., Phil'a.
Burnet Landreth, Bristol.
Archibald R. Montgomery, Bryn Mawr.
Chas. L. Sharpless, Philadelphia.

Pittsburgh Committee.

William S. Bissell, Pittsburgh.
Thomas J. Bigham, Pittsburgh.
W. W. Speer, Pittsburgh.
John McDowell, Washington.
John Murdoch, Jr., Pittsburgh.
Gen. W. H. Kountz, Pittsburgh.

SUPERINTENDENTS OF DEPARTMENTS.

DEPARTMENT I.—Live Stock.

Dr. L. Henry Twaddell, Superintendent.

DEPARTMENT II.—Forest, Farm, and Garden Products, and their Derivatives.

Daniel Shelly, Assistant Superintendent.
Groups IX to XVII, inclusive.

Wm. A. Maupay, Assistant Superintendent.
Groups XVIII to XXII, inclusive.

DEPARTMENT III.—Apparel and Household Goods.

C. Henry Roney, C. E., Superintendent.

DEPARTMENT IV.—Tools, Implements, and Machinery.

Thomas G. Janvier, C. E., Superintendent.

DEPARTMENT V.—Farm, Family, and Popular Improvement.

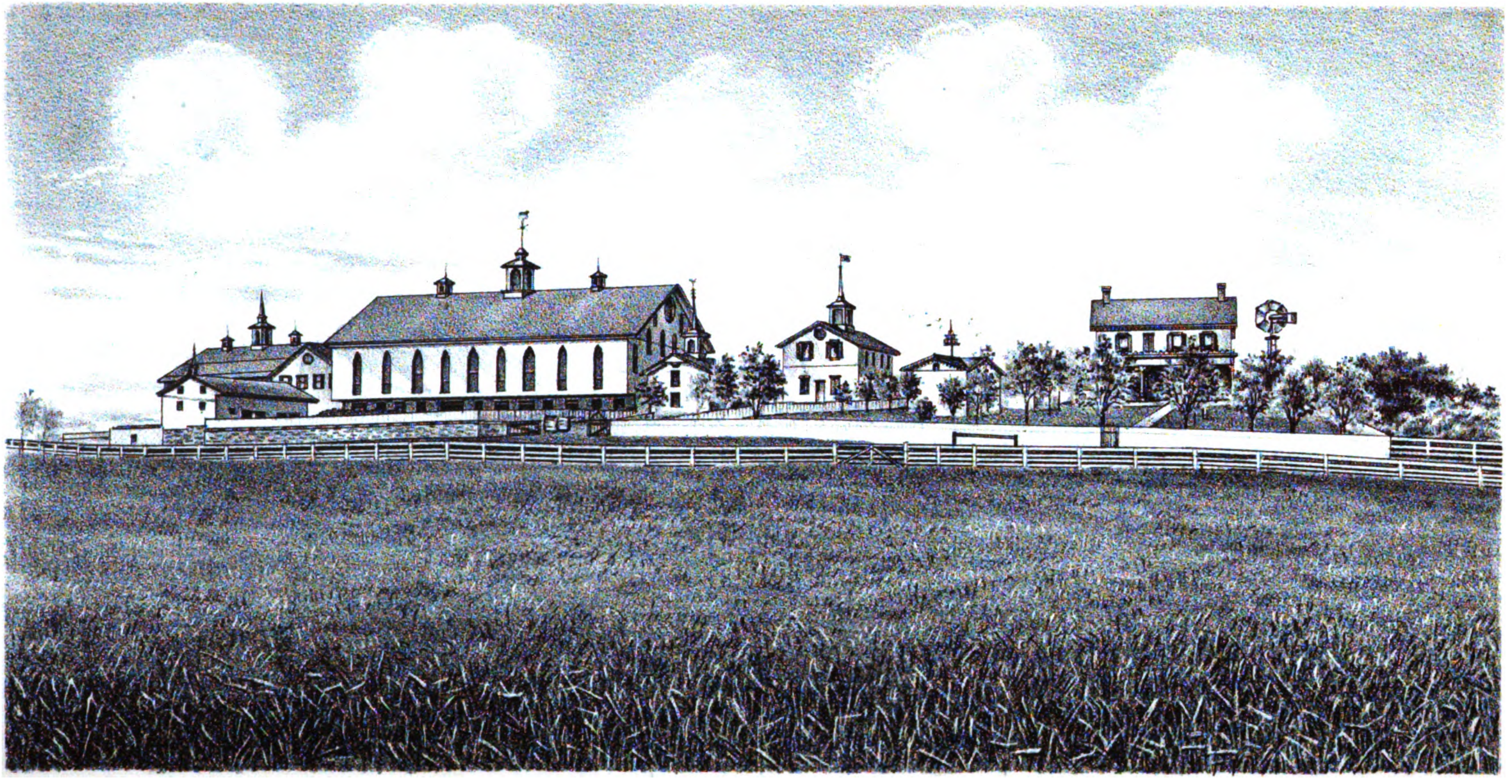
C. Henry Roney, C. E., Superintendent.

LIFE MEMBERS.

Austin, John B., Philadelphia.
Alibone, Thomas, Philadelphia.
Allen, Josiah J., Philadelphia.
Anspach, J., Jr., Philadelphia.
Armstrong, James, Williamsport.
Allen, Robert P., Williamsport.
Andrus, D. S., Williamsport.
Allen, Charles, Williamsport.
Armstrong, William H., Williamsport.
Allen, John H., Montourstown.
Ayres, J. J., Williamsport.
Andrews, E., Williamsport.
Allen, William H., Agricultural College.
Armstrong, W. H., Easton.
Ashbridge, E. B., Willistown Inn P. O.
Allen, John E., Middletown.
Alricks, William K., Harrisburg.
Allen, John F., Harrisburg.
Anderson, James, Hogestown.
Archer, W. L., Burgettstown.
Adney, W. H. G., Washington.
Bucher, G. H., Hogestown, Cumb. co.
Biddle, Craig, Philadelphia.
Boal, George, Boalsburg.
Bryson, Robert, Carlisle.
Baldwin, M. W., Philadelphia.
Brock, William Penn, Philadelphia.
Biddle, Alexander, Philadelphia.
Brown, George H., Philadelphia.
Bolden, George, Philadelphia.
Bard, Edwin Milford, Philadelphia.
Baxter, Isaac B., Philadelphia.
Burnside, James, Bellefonte.
Benson, Alexander, Philadelphia.
Benson, G. S., Philadelphia.
Bradford, Vincent L., Philadelphia.
Brown, John A., Philadelphia.
Billings, James B., Philadelphia.
Brown, David S., Philadelphia.
Baker, Elias, Altoona.
Brautigam, Daniel, Northumberland.
Brown, Jacob B., Columbia.
Bell, Samuel, Reading.
Bell, William, Mifflin.
Bennett, James, Pittsburgh.
Beck, John B., Williamsport.
Bowman, Samuel, Wilkes-Barre.
Breeze, N. W., Wyoming.
Barto, Tobias, Reading.
Bercaw, Abraham, Easton.
Berkenbine, Samuel A., Northumberland.
Blair, Horace H., Williamsport.
Beard, Henry, Williamsport.
Beck, Samuel M., Williamsport.
Brown, James V., Williamsport.
Brown, Jacob, Newberry.
Berry, John J., Williamsport.
Bush, D., G., Bellefonte.
Butt, Charles H., Williamsport.
Bender, George H., Easton.
Blight, George, Germantown.
Boyd, T. S., Easton.
Brawdy, George, Sharpsburg.
Bergner, George, Harrisburg.
Bissell, William S., Pittsburgh.
Bittenbender, Stephen, Shamokin.
Brown, G. W., M. D., Port Carbon.
Boyd, S. T., Easton.
Buehler, William, Harrisburg.
Boas, C. A., Harrisburg.
Bates, Abram, Harrisburg.
Bigler, Samuel S., Harrisburg.
Bomberger, Jacob C., Harrisburg.
Boyer, W. W., Harrisburg.
Briggs, John H., Harrisburg.
Boas, D. D., Harrisburg.
Bird, Joseph, Northumberland.
Buehler, Charles, Harrisburg.
Barr, W., Dr., Harrisburg.
Bailey, Charles L., Pottstown.
Brown, James C., New Greenville.
Bound, David T., Kingston.
Branson, D. H., Coatesville.
Baldwin, W. A., Williamsport.
Brown, ——, Titusville.
Baker, J. B., Thorndale, Chester co.
Baker, J. B., Jr., Thorndale, Chester co.
Boyd, J. F., Chambersburg.
Bergner, C. H., Harrisburg.
Cameron, Simon, Middletown.
Curwen, John, Harrisburg.
Chambers, Andrew R., Philadelphia.
Christian, S. J., Philadelphia.
Campbell, Hugh, Philadelphia.
Campbell, James R., Philadelphia.
Cadwallader, George, Philadelphia.
Colkit, C., Philadelphia.
Craig, Hugh, Philadelphia.
Carpenter, George W., Jr., Germantown.
Campbell, Thompson, San Francisco, Cal.
Cassidy, Joseph A., Philadelphia.
Clark, Edward S., Philadelphia.
Carmalt, S., Friendsville, Susquehanna co.
Cresson, John C., Philadelphia.
Carlisle, Robert M., Philadelphia.
Cornell, Adrian, Newton, Bucks county.
Campbell, William S., Philadelphia.
Cowden, J. B., Northumberland.
Chess, Moses, Temperanceville.
Calder, William, Harrisburg.
Conyngham, John N., Wilkes-Barre.
Corson, George N., Norristown.
Cake, Joseph W., Northumberland.
Calder, James, Rev., Harrisburg.
Clymer, Hiester, Reading.
Conner, Joseph P., Fowlersburg.
Crans, Samuel M., Williamsport.
Campbell, John R., Williamsport.

Clark, James, Williamsport.
Clay, M. L., Williamsport.
Coleman, Fletcher, Williamsport.
Canfield, Ezra, Williamsport.
Campbell, E. B., Jersey Shore.
Cummings, R. D., Bellefonte.
Claydon, William, Pine Grove.
Cramer, Jacob, Uniontown.
Carter, William N., Jersey Shore.
Coryell, John B., Williamsport.
Crawford, A. S., Williamsport.
Colton, Henry, Williamsport.
Coder, N. B., Williamsport.
Capron, E. W., Williamsport.
Calvin, Otts P., N. Y. city, 284 Broadway.
Carpenter, E. P., Pittsburgh.
Cummings, A. B. Philadelphia.
Charles, J. S., Pittsburgh.
Cluly, William, Pittsburgh.
Coburn, J. P., Aaronsburg, Centre co.
Crawford, M. H., Philadelphia.
Child, S. S., Harrisburg.
Commings, Charles, Harrisburg.
Colestock, Jacob M., Harrisburg.
Colestock, Samuel J., Harrisburg.
Cassell, Jacob, Harrisburg.
Crisswell, J. Vance, Harrisburg.
Coover, John B., Mechanicsburg.
Cameron, J. D., Harrisburg.
Chrisman, R. R., Harrisburg.
Callahan, George, Philadelphia.
Connelly, John, Hyde Park.
Cassatt, A. J., Philadelphia.
Crawford, Albert, Philadelphia.
Clark, James, Harrisburg.
Culver, W. B., Scranton.
Darlington, J. Lacy, West Chester.
Davis, Atlee G., Philadelphia.
Dettry, Henry F., Philadelphia.
Dickey, E. V., Oxford.
Derbyshire, A. J., Philadelphia.
Durar, Enoch, Philadelphia.
Dallett, John, Philadelphia.
Devereux, John Philadelphia.
Devereux, James, Philadelphia.
Deal, Daniel, Philadelphia.
Dasher, David, Harrisburg.
Drinker, H., Montrose.
Driesbach, Daniel G., Beach Haven.
Davis, William L., Easton.
Dœbler, V. S., Williamsport.
Dunlap, H. E., Newberry.
Davis, John L., Newberry.
DuBois, John, Williamsport.
Datesman, Robert, Milton.
DeHaven, Jehu, Harrisburg.
Dempster, Robert, Phillipsburg, N. J.
Duncan, J. L., M. D., Pittsburgh.
Demees, John, Shamokin.
Darlington, H., Pittsburgh.
Davis, Joseph H., Pittsburgh.
Dull, J. J., Harrisburg.
Dougherty, James D., Harrisburg.
Dougherty, Daniel, Harrisburg.
Deitz, George A., Chambersburg.
DuBarry, J. N., Harrisburg.
Dillingham, J. B., West Chester.
Davis, E. W., Philadelphia.
Eli, Richard E., Philadelphia.
Evans, David, Philadelphia.
Edwards, William A., Philadelphia.
Ellis, William, Philadelphia.
Evans, John, York.
Elwyn, A. L., Philadelphia.
Eby, Jacob R., Harrisburg.
Eichbaum, William, Pittsburgh.
Eberly, Christian, Cumberland.
Everhart, J. T., Pittston.
Engle, Charles K., Bustleton.
Ellis, B. Morris, Hughesville.
Early, Martin, Palmyra.
Eddy, George W., Philadelphia.
Ensworth, L. A., Williamsport.
Eves, George S. Williamsport.
Embick, Frederick E., Williamsport.
Eldred, Charles D., Williamsport.
Elder, Mathias, Williamsport.
Edwards, Charles, Williamsport.
Elliott, William G., Williamsport.
Eveland, S. D., Williamsport.
Evender, Thomas, Williamsport.
Epes, William J., Williamsport.
Elser, D. B., Williamsport.
Eckert, Isaac, Reading.
Evans, Robert, Erie.
Ever, Andrew, Muncy.
Elder, James, (Swatara,) Harrisburg.
Elliott, B. A. Pittsburgh.
Elliott, W. R., Pittsburgh.
Estep, J. P., Pittsburgh.
Etter, B. F., Harrisburg.
Emminger, John, Hogestown.
Early, D. S., Hummelstown.
Egle, W. H., M. D., Harrisburg.
Ensminger, J. T., Harrisburg.
Emminger, W. H., Harrisburg.
Edwards, Oliver, Harrisburg.
Engelbert, A. F., Wiconisco.
Fager, George C., Harrisburg.
Fertig, John, Titusville.
Freas, P. R., Germantown.
Frantz, Jacob, Mount Hope, Lancaster co.
Fotterall, Stephen G., Philadelphia.
Foster, Frank T., Philadelphia.
Failes, George, Philadelphia.
Fallon, Christ'r U., Darby, Delaware co.
Flenniken, J. C., Waynesburg, Greene co.
Felton, S. M., Philadelphia.
Fulton, Andrew, Pittsburgh.
Firmstone, William, Easton.
Fleming, Robert, Williamsport.
Fessler, Philip, Williamsport.
Forseman, Robert M., Williamsport.
Fisher, John S., Williamsport.
Forseman, D. W., Williamsport.
Foresman, John, Williamsport.
Foresman, Daniel F., Slifer, Union co.
Foresman, R. S., Williamsport.
Fuller, J. W., Montoursville.
Farrell, John, Pittsburgh.
Fass, G., Allegheny city.
Frisch, B., Harrisburg.
Fisler, J. E., Harrisburg.
Fisler, Amos, Harrisburg.
Fleming, Dr. James, Harrisburg.
Flickinger, Samuel, Harrisburg.
Fisher, John R., Harrisburg.
Fox, Richard, Hummelstown.
Feeman, Valentine, Harrisburg.
Fellowes, J. Turbey, Scranton.
Fiske, A. R., Harrisburg.
Farnum, J. E., Philadelphia.
Filler, John H., Harrisburg.
Gowen, James, Mount Airy, Philadelphia.
Grout, H. T., Philadelphia.
Gries, John M., Philadelphia.

Grigg, John, Philadelphia.
Grigg, John Warner, Philadelphia.
Glass, Alexander F., Philadelphia.
Garber, Jacob B., Columbia.
Gillespie, James, Philadelphia.
Gould, J. E., Philadelphia.
Gross, Daniel W., Harrisburg.
Gilbert Henry, Harrisburg.
Gardner, Jacob, Pittsburgh.
Goe, John S., Brownsville.
Goe, John S., jr., Brownsville.
Gould, Stephen, Williamsport.
Gould, John, Luzerne co.
Gehr, D. O., Chambersburg.
Garis, David, Easton.
Gilmore, Joseph, Williamsport.
Grier, James, Newberry.
Gibson, C. E. Williamsport.
Gould, Robert S., Williamsport.
Gibson, John, Williamsport.
Garman, Samuel, Williamsport.
Gould. Alexander S., Hickory Run, Lycoming co.
Gregg, Theodore, Bellefonte.
Guernsey, H. A., Philadelphia.
Gaynor, Edward J., Easton.
Greenawalt, Alex., Allegheny city.
Glenn, John McDonald, Pittsburgh.
Glenn, Robert W., Noblestown.
Grove, M. M., Harrisburg.
Gohl, A. Harrisburg.
Garman, John, Hyde Park.
Griffin, Henry, Scranton.
Germyn, John, Rushdale.
Gibbs, J. W., M. D., Hyde Park.
Gregory, J. W., Scranton.
Griest, Chas W., York Sulphur Springs.
Gowen, F. B., Philadelphia.
Hammond, John W., Erie.
Haldeman, Jacob S., New Market.
Heister, A. O., Harrisburg.
Hutchinson, J. Pemberton, Philadelphia.
Hickok, W. O., Harrisburg.
Hacker, William, Philadelphia.
Harvey, Chalkey, Chaddsford.
Haseltine, John, Philadelphia.
Hart, William H., Philadelphia.
Hoopes, Thomas P., Philadelphia.
Hamilton, A. Boyd, Harrisburg.
Hoffman, H. W., Harrisburg.
Haldeman, Jacob M., Harrisburg.
Haddock, D., jr., Philadelphia.
Hall, George E., Philadelphia.
Heister, F. A. M., Reading.
Haehnlen, Frederick P., Harrisburg.
Hoffer, John, Harrisburg.
Hamilton, Hays, Huntingdon Furnace.
Haldeman, S. S., Columbia.
Hicks, James, Pittston.
Hutchins Thomas, Wyoming.
Harvey, E. B., Wilkes-Barre.
Hollenback, George M., Wilkes-Barre.
Hitner, Henry S., Barren Hill.
Holstein, William H., Bridgeport.
Hartranft, Samuel E., Norristown.
Haehnlen, Jacob, Harrisburg.
Hackett, J. M., Easton.
Hetrick, Josiah P., Easton.
Hutter, William H., Easton.
Hartman, John, Williamsport.
Hartman, Mathias, Catawissa.
Herdic, Peter, Williamsport.
Hill, Theodore, Williamsport.
Hall, John B., Williamsport.
Hudson, Joseph E., Williamsport.
Hagerman, Augustus H.. Williamsport.
Heidler, David, Williamsport.
Holden, H. L., Williamsport.
Hays, J. W., Williamsport.
Huling, Louis G., Williamsport.
Hinkle, John R., Newberry.
Higgins, William C., Williamsport.
Huyck, George, Newberry.
Hull, Joseph F., Hull's Mill.
Hepburn, Andrew, Williamsport.
Harrington. Thomas L., Williamsport.
Heylmun, E. G., Crescent, Lycoming co.
Howell, A., Williamsport.
Howland, Rausford, Williamsport.
Hastings, H. S., Williamsport.
Holliday, B. B., Wellsboro'.
Hepburn, John, Williamsport.
Hagy, Philip, Williamsport.
Hull, W. R., Cogan Station.
Hise, Adam, Williamsport.
Hamilton, Cyrus E., Williamsport.
Hoffman, Philip, Williamsport.
Hester, Joseph M., Easton.
Helick, Reuben, Easton.
Higgins, William V., Williamsport.
Hemingway. E. E., Easton.
Hugus, P., Pittsburgh.
Hale, James P., Osceola, Clearfield co.
Higgins, William V., Williamsport.
Herr, Henry, Harrisburg.
Hummel, Richard H., Harrisburg.
Hummel, William, Harrisburg.
Hickman, Amos S., Monticello, Illinois.
Hynicka, George, Harrisburg.
Hummel, S. A., Harrisburg.
Haehnlen, William, Harrisburg.
Hamilton, Hugh, Harrisburg.
Hargest, William F., Harrisburg.
Hostic, John, Harrisburg.
Herr, D. S , Harrisburg.
Hummel, Alfred, Harrisburg.
Hall, John W., Harrisburg.
Heck, Lewis, M. D., Dauphin.
Hamilton, T. A., Harrisburg.
Hain, George, Lower Paxton, Dauphin co.
Hoffman, H. B., Millersburg.
Hunter, George W., Harrisburg.
Hutchison, J. W., Harrisburg.
Hildrup, W. T., Harrisburg.
Halstead, N., Scranton.
Hill, J. F., Scranton.
Halstead, W. F., Scranton.
Hinckley, Isaac, Philadelphia.
Herman, John C., Harrisburg.
Ingersoll, Harry, Philadelphia.
Irwin, James, Philadelphia.
Innis, John A., Easton.
Jordan, John, Philadelphia.
Jefford, A. M., Wyoming.
Jenkins, G. S., Wyoming.
Jenkins, Steuben, Wyoming.
Jones, Daniel, Exeter, Luzerne co.
Jessup, William H., Wilkes-Barre.
Jackson, George D., Dushore, Sullivan co.
Johnston, William, Easton.
Jones, John E., Williamsport.
Jarrett, John, Hepburn, Lycoming co.
Jones, Samuel, Williamsport.
Jamison, Edward, Newberry.
Jamison, L., Williamsport.
Jeter, Tinsley, Bethlehem.



Model Farm Buildings,

OAK LANE FARM,

Situate 1 Mile N.W. Borough Middletown, Dauphin County, on line of Penn.ª R.R.

Owned by James Young.

Jones, B. F., Pittsburgh.
Jordan, Thomas J., Harrisburg.
Jones, W. H., Philadelphia.
Kennedy, A. L., Philadelphia.
Kapp, Amos E., Northumberland.
Kramer, Philip, Philadelphia.
Keim, George M., Reading.
Knight, William K., Philadelphia.
Kimball, Stephen, Philadelphia.
Kelly, Charles, Kellyville, Delaware co.
Knox, Thomas P., Norristown.
Knight, Edward C., Philadelphia.
Keller, John S., Orwigsburg.
Kunkle, Benjamin S., Harrisburg.
Knapp, D. B., Williamsport.
King, C. M., White Deer Mills, Centre co.
Kinyon, S. C., Williamsport.
Kunsman, William H., Easton.
Kelly, Dennis, Kellyville, Delaware co.
King, Alexander, Pittsburgh.
Kreybill, Jacob E., Marietta.
Knipe, Joseph F., Harrisburg.
Koller, Henry M., Harrisburg.
Kuhn, William, Harrisburg.
Keely, Jerome, Union Deposit, Dauphin co.
Kirby, William C., Harrisburg.
Kepple, John, Harrisburg.
Kirkpatrick, J. D., North Liberty, Mercer county.
Kelker, Immanuel, Harrisburg.
Keim, George de B., Philadelphia.
Kenny, L., Philadelphia.
Kennedy, Thomas B., Chambersburg.
Lukenbaugh, Charles Augustus, Bethlehem.
Longstreth, John, Bristol.
Lauman, George M., Harrisburg.
Lauguerrene, P. L., Philadelphia.
Lancaster, J. B., Philadelphia.
Linn, Philip, Harrisburg.
Lafrance, Isaac T., Wyoming.
Lee, Washington, jr., Wilkes-Barre.
Leacock, J. R., Wyoming.
Longaker, A. Brower, Norristown.
Line, J. M., Allentown.
Lawell, Edward, Easton.
Lerch, Frederick, Easton.
Logan, Millard F., Williamsport.
Lowe, Ellis S., Williamsport.
Love, Samuel, Williamsport.
Lyon, Thomas, Williamsport.
Lippincott, Edward, Williamsport.
Lentz, George W., Williamsport.
Lehman, M., Williamsport.
Levan, E. M. D., Williamsport.
Long, Henry B., Pittsburgh.
Long, W. J., Osceola, Clearfield co.
Lamberton, Robert A., Harrisburg.
Lauer, Frederick W., Reading.
Lemon, John A., Hollidaysburg.
Lafferty, Charles, Philadelphia.
Marvin Selden, Erie.
McAllister, H. N., Bellefonte.
Marshall, William, Bellefonte.
Meredith, James M., West Chester.
McKinley, Isaac G., Harrisburg.
Miles, James, Girard, Erie county.
McIlvaine, Abram R., Brandywine Manor, Chester county,
McGowen, John, Bridesburg, Philadelphia.
Murdock, John, junior, Pittsburgh.
Myers, Joseph B., Philadelphia.
Mellor, Thomas, Philadelphia.
Mellon, Thomas, Philadelphia.
Magee, James, Philadelphia.
McCully, Francis G., Philadelphia.
Messchart, H., Philadelphia.
McKean, H. P., Philadelphia.
McKean, Samuel M., Williamsport.
Martin, George H., Philadelphia.
McCrea, William H., Philadelphia.
McIntyre, Peter, York.
McFarland, John, Ligonier.
Middleton, E. P., Philadelphia.
Magee, George, Philadelphia.
Muhlenberg, H. H., Reading.
McDowell, John, Washington.
Murray, William F., Harrisburg.
McAllister, Archibald, Springfield Furnace, Blair county.
Metzgar, William, Harrisburg.
Murdock, A. C., Pittsburgh.
Merrick, George, Northumberland.
McAllister, John C., Fort Hunter, Dauphin county.
Maxwell, Henry D., Easton.
Myers, Henry, Forty Fort.
Marcy, Ira, Wilkes-Barre.
McCrea, James A., Philadelphia.
Martin, Dewees J., Allentown.
Mutchler, John, Easton.
McMinn, J. M., Williamsport.
Mudge, Hiram, Williamsport.
Munday, J. S., Williamsport.
McLowell, Lewis, Williamsport.
McCormick, Robert, Montoursville.
Moore, Wesley, Newberry.
Mahaffey, David, Cogan Station.
Mahaffey, Lindsey, Newberry.
McMicken, J. B., Williamsport.
Miller, Larr, Wayne, Clinton county.
Mahaffey, William J., Newberry.
Maxwell, Jacob S., Williamsport.
Miles, James, Milesgrove.
Morse, H. S., Williamsport.
Montgomery, J. B., Williamsport.
Munday, H. F., Williamsport.
Morrison, S. G., Williamsport.
Morris, John C., Friendsville.
McCauley, George W., Harrisburg.
Messinger, Samuel, Easton.
McCain, Daniel, Allegheny City.
McKelvy, James, Wilkinsburg, Allegheny county.
Morris, D. B., Pittsburgh.
McPherson, J. S., Wilkins.
McNish, A. L., Pittsburgh.
Marchand, John, Pittsburgh.
Magan, David, New Brighton, Beaver co.
McFarland, John, Northumberland.
Montgomery, Joseph, Harrisburg.
Motter, John, Harrisburg.
Mark, George M., Harrisburg.
Middleton, Richard, Harrisburg.
Miller, William H., Harrisburg.
Mumma, David, Harrisburg.
McFarland, George F., Harrisburg.
McConkey, Elbridge, Harrisburg.
McDonald, Lewis, Harrisburg.
McCormick, David, Harrisburg.
Miller, J G, Harrisburg.
McCormick, James, Harrisburg.
Morse, L. W., Ledgedale, Wayne county.
Moore, E. B., West Chester.
McPherson, Edward, Gettysburg.

Monaghan, R. E., West Chester.
Meyers, B. F., Harrisburg.
McClure, A. K., Philadelphia.
McDowell, John, Washington.
Newbold, A. T., Philadelphia.
Neilson, Robert, Philadelphia.
Neff, Robert K., Philadelphia.
Newton, G. B., Springfield, Delaware co.
Noble, John, Carlisle.
Noble, F. W., Easton.
Nissley, John J., Hummelstown.
Nicely, George W., Newberry.
Nutting, Lyman, Pine Grove, Schuylkill county.
Nichols, Joseph, Williamsport.
Nichols, W. F., Williamsport.
Neilman, D. H., Easton.
Nissley, Joseph, Harrisburg.
Opp, George S., Maryland, Lycoming county.
Osthout, Jacob H., Harrisburg.
Odenwelder, Henry L., Easton.
Olwine, Benjamin, Harrisburg.
Ott, Leander N., Dauphin county.
Packer, William F., Williamsport.
Pritchett, Borradaile, Frazier, Chester co.
Perrott, W. S., Philadelphia.
Pennock, Samuel, Kennet Square, Chester county.
Pratt, Thomas, Philadelphia.
Pomeroy, John L., Philadelphia.
Peyson, Augusta, Philadelphia.
Patterson, Robert, Philadelphia.
Physic, Emlen, Philadelphia.
Presbury, George G., jr., Philadelphia.
Priestly, J. R., Northumberland.
Parsons, H. K., Harrisburg.
Peters, Benjamin G., Harrisburg.
Pennock, Joseph, Harrisburg.
Patterson, Robert H., Pittsburgh.
Powell, Robert H., Philadelphia.
Paxton, Joseph, Catawissa.
Polen, Albert, Wyoming.
Peters, C. P., Concordsville.
Potts, E. Channing, Norristown.
Parsons, Leroy, Harrisburg.
Pyle, R. C., Easton.
Purcell, Sylvester, Bloomsburg.
Parsons, Henry C., Williamsport.
Piatt, John, Williamsport.
Pollock, Samuel, Williamsport.
Porter, John F., Newberry.
Parker, Samuel J., Williamsport.
Perkins, H. J., Williamsport.
Perkins, James H., Lemar.
Page, A., Williamsport.
Post, G. S., Williamsport.
Parke, John E., Pittsburgh.
Patterson, Lebanon Church, Allegheny county.
Phelps, W. H., Pittsburgh.
Pemberton, Clifford, Pittsburgh.
Phillips, John, Pittsburgh.
Power, John, Harrisburg.
Parsons, George W., Harrisburg.
Patton, William, Philadelphia.
Postlethwaite, E. T., Philadelphia.
Patterson, John, Glenmore, Chester co.
Rogers, C. B., Philadelphia.
Roberts, Algernon S., Philadelphia.
Rutherford, John P., Harrisburg.
Rice, John, Philadelphia.
Rice, William, Philadelphia.
Roberts, Isaac, Norristown.
Rudman, William C., Philadelphia.
Robeson, H. P., Robesonia, Berks co.
Rodgers, Fairman, Philadelphia.
Rhodes, William A., Philadelphia.
Ripka, Joseph, Philadelphia.
Remington, Thomas P., Philadelphia.
Ronaldson, Richard, Philadelphia.
Reif, C. P., Philadelphia
Rutherford, S. S., Harrisburg.
Rutherford, Abner, Harrisburg.
Reilly, John A., Harrisburg.
Robb, Jacob, Pittsburgh.
Robinson, ——, Philadelphia.
Rutter, Nathaniel, Wilkes-Barre.
Ross, William S., Wilkes-Barre.
Rutherford, John B., Harrisburg.
Ruggles, A. C., Williamsport.
Rutherford, W. F., Paxton.
Reighard, James B., Newberry.
Reighard, Daniel, Newberry.
Renninger, W. H., Williamsport.
Rook, D. N., Williamsport.
Rank, L. D., Williamsport.
Rouse, William A., Harrisburg.
Reed, Alexander, Lock Haven.
Rodenbough, Joseph S., Easton.
Reeder, Mrs. A. H., Easton.
Richards, Henry, Easton.
Reigel, Joseph, Easton.
Roth, Jeremiah, Allentown.
Rogers, Phelix, Pittsburgh.
Rowley, Thomas A., Pittsburgh.
Russell, Alexander L., Harrisburg.
Rogers, Lucius, Smethport, McKean co.
Raymond, James, Harrisburg.
Reel, Augustus, Harrisburg.
Rutherford, William S., Harrisburg.
Reel, John, Harrisburg.
Reed, James, Middle Paxton, Dauphin co.
Reichenbach, E. C., Harrisburg.
Rudy, Joseph, Harrisburg.
Rutherford, F. W., Paxton.
Rupp, Henry S., Shiremanstown, Cumberland county.
Rutherford, J. E., Harrisburg.
Rhey, Geo., Millwood, Westmoreland co.
Richmond, William H., Carbondale.
Rand, George W., Scranton.
Reed, E. W., Erie.
Rutherford, Silas, Paxton.
Rutherford, J. Q. A. Paxton.
Savery, Peleg B., Philadelphia.
Stambaugh, S. C., Lancaster.
Sergeant, William, Philadelphia.
Strouble, Jacob, Zion, Centre county.
Snow, Edward K., Philadelphia.
Sharp, Joseph W., Philadelphia.
Stavely, William, Lahaska, Bucks county.
Smith, Daniel, jr., Philadelphia.
Smith, Thomas, Philadelphia.
Scull, Gideon, Philadelphia.
Silverthorn, M. H., Fairview, Erie co.
Simmons, A. H., Philadelphia.
Starr, Isaac, Philadelphia.
Shoemaker, B. A., Philadelphia.
Schaffer, W. L., Philadelphia.
Smith, Geo., Upper Darby, Delaware co.
Sheridan, Owen, Philadelphia.
Speer, William, Pittsburgh.
Spencer, S. S., Lancaster.
Swift, Joseph, Philadelphia.
Struthers, William, Philadelphia.

Slade, Alfred, Philadelphia.
Stuart, George H., Philadelphia.
Small, Samuel, York.
Sharwood, Dendy, Philadelphia.
Stone. Daniel, Philadelphia.
Speer, Alexander, Pittsburgh.
Stokes, William A., Greensburg.
Sturdevant, E. W., Wilkes-Barre.
Sheets, J. H. Von, Orwigsburg.
Shoemaker, William M., Wyoming.
Sturdevant, E. J., Wyoming.
Speece, L. B., Wyoming.
Smith, J. B., Dunmore.
Shoemaker, William S., Wyoming.
Schooley, J. B., Wyoming.
Smith, J. B., Plymouth.
Shoemaker, Elijah, Kingston.
Sharp, John, jr., Wyoming.
Stark, J. B., Wilkes-Barre.
Stephens, Z., Scranton.
Sower, F. D., Norristown.
Schall, David, Norristown.
Schreiber, O. L., Laubach, Northampton county.
Sigman, Joseph, Easton.
Snyder, Daniel W., Easton.
Schreiner, J. W., Lewisburg.
Singer Manufacturing Co., Philadelphia.
Swan, Rufus C., Williamsport.
Sheffler, A. G., Williamsport.
Smith, Henry B., Williamsport.
Smith, Joseph W., Newberry.
Stearns, L. L., Williamsport.
Stewart, Robert, Lemar.
Showers, Jesse, Rauch Gap.
Smith, Thomas, Williamsport.
Showers, D. H., Williamsport.
Smith, Daniel W., Williamsport.
Saxton, J. O., New Kingston.
Shaw, Hugh, Jersey Shore.
Smith, J. D. L., Mill Hall.
Seltzer, George L., Myerstown.
Seitz, George, Easton.
Seitz, Frederick, Easton.
Serch, David, Easton.
Scott, John, Pittsburgh.
Sharpless, S. J., Street Road, Chester co.
Smith, George, New York city.
Seiler, Daniel W., Harrisburg.
Shoemaker, John, Harrisburg.
Scheffer, Theodore, Harrisburg.
Smith, Jacob, Harrisburg.
Shaffer, William S., Harrisburg.
Simon, John B., Harrisburg.
Smull, John A., Harrisburg.
Shellenberger, Henry, Harrisburg.
Scott, George, Catawissa.
Sharp, Samuel W., Newville.
Sheck, J. H., Harrisburg.
Silkman, William M., Scranton.
Smith, H. K., Philadelphia.
Sharpless, Charles L., Philadelphia.
Singerly, W. M., Philadelphia.
Smith, George Handy, Philadelphia.
Steel, John M., Greensburg.
Steel, William, Greensburg.
Smith, Philip L., Philadelphia.
Thompson, John I., Half Moon, Centre co.
Thomas, George, Belvidere, Chester co.
Thatcher, Richard, Marsh, Chester co.
Toppan, Charles, Philadelphia.
Thompson, N. B., Philadelphia.
Tatham, H. B., Philadelphia.
Tatham, George N., Philadelphia.
Towers, William H., Philadelphia.
Taggart, David, Northumberland.
Taggart, John, Northumberland.
Tasker, Thomas T., Philadelphia.
Tripp, Ira, Scranton.
Trout, Michael C., Sharon, Mercer co.
Tyson, Carrol S., Norristown.
Thomas, Henry, Harrisburg.
Templin, James R., Easton.
Taylor, Benjamin H., Williamsport.
Taylor, Horace E., Williamsport.
Thompson, James, Cogan Station.
Trump, Edward D., Jersey Shore.
Tinsman, Garrett, Williamsport.
Tinseley, Peter, Bethlehem.
Thayer, Russel A., Allentown.
Templin, William, Harrisburg.
Taylor, William, Womelsdorf, Berks co.
Taylor, B. Frank, Womelsdorf.
Taylor, George R., Womelsdorf.
Thomson, Frank, Philadelphia.
Twaddell, L. H., Philadelphia.
Urquehart, John, Wilkes-Barre.
Updegraff, A., Wilkes-Barre.
Updegraff, Thomas, Newberry.
Updegraff, Daniel, Newberry.
Updegraff, Derrick, Newberry.
Unger, David J., Harrisburg.
Unger, John G., Harrisburg.
Van Leer, Isaac W., Wallace, Chester co.
Vouges, James C., Philadelphia.
Vanvoorhis, H. B., Pittsburgh.
Vanscoy, Daniel, Wyoming.
Van Vorce, John, Williamsport.
Van Buskirk, S., Williamsport.
Vandike, James, Northumberland.
Walker, George, Montrose.
Watts, Frederick, Carlisle.
Walker, R. C., Elizabeth, Allegheny co.
Wood, Robert, Philadelphia.
Waterman, Joseph, Philadelphia.
Wister, Richard, Philadelphia.
Watson, Johanna, Philadelphia.
Welsh, William, Philadelphia.
Welsh, John, Philadelphia.
Welsh, Samuel, Philadelphia.
Woodward, George W., Philadelphia.
Weaver, H. A., Pittsburgh.
Wright, Joshua, Washington co.
Watson, A. W., Harrisburg.
Walters, S. H., Northumberland.
Wright, Joshua, Findleyville, Washington co.
Waterman, Albert G., Philadelphia.
Wood, Thomas, Penningtonville.
Woodhams, Samuel, Plymouth.
Williams, Stiles, Wilkes-Barre.
Wright, H. B., Wilkes-Barre.
Waters, Towsend, West Chester.
Wetherill, William, Norristown.
Wentz, Thomas H., Norristown.
Whitman, Joseph, Centre Valley P. O.
Williams, E. C., Harrisburg.
Woodward, John V., Williamsport.
Watson, Oliver, Williamsport.
White, Henry, Williamsport.
Wolf, Peter, Williamsport.
Wingard, Samuel C., Williamsport.
Watson, Henry W., Williamsport.
Weaver, M. B., Williamsport.
White, John, Williamsport.
Wait, B., Williamsport.

Wood, James M., Williamsport.
Westcott, Thos. S., Ashland, Schuylkill co.
Ward, C. L. Towanda.
Workheiser, Enos, Easton.
Wallace, W. W., Pittsburgh.
Withington, W. P., Shamokin.
Way, John, jr., Pittsburgh.
White, J. A. G., Osceola, Clearfield co.
Wallower, John, Harrisburg.
Winters, George, Harrisburg.
Wolfinger, Levi, Harrisburg.
Wible, William, Gettysburg.
Watts, William M., Mechanicsburg.
Warford, A. B., Harrisburg.
Wolf, William, Harrisburg.
Wilhelm, A., Cornwall.
Walker, John H., Erie.
Waggoner, John A., Harrisburg.
Walter, D. J., Bloomsburg.
Yeager, Joseph, Philadelphia.
Young, Alexander, Philadelphia.
Yeaton, William H., Philadelphia.
Youngman, George W., Williamsport.
Young, William, Easton.
Young, John, jr., Ewing's Mills, Allegheny co.
Young, James, Middletown.
Ziegler, John H., Harrisburg.
Zimmerman, F., Williamsport.
Zimmerman, A. M., Harrisburg.
Zerbe, Cyrus, Harrisburg.

TRANSACTIONS OF THE SOCIETY.

ERIE, *September 27, 1878.*

The meeting was called to order by President HAMMOND.

The following members were present: Messrs. McCrea, Bissell, Branson, Holstein, Barto, Waller, Tripp, Smull, Gehr, Mackey, Rhey, Murdoch, McDonell, Kirkpatrick, Reed, Abner Rutherford, McConkey, Egle, and Seiler.

The reports of the Committee on Awards were read.

In class No. 6, the award to stallion Paris, was amended, making a special premium for the same of ten ($10) dollars.

Mr. McCREA offered the following:

Resolved, That Messrs. Murdoch, Speer, Bissell, McConkey, and Seiler be appointed a committee to examine the grounds at Pittsburgh, with reference to holding the next annual exhibition at that place, confer with the exposition managers there, and report to the Executive Committee of this Society, at the January meeting, in 1879.

Agreed to.

Mr. HOLSTEIN:

Resolved, That the thanks of the Pennsylvania State Agricultural Society be extended to the ladies of the city of Erie and vicinity, for the very efficient manner in which they provided dinner for the officers of this Society and visitors to the fair.

Agreed to.

Mr. KIRKPATRICK moved that the expenses of the Executive Committee be not paid until the January meeting.

Agreed to.

Mr. SMULL:

Resolved, That the thanks of this Society be and are hereby tendered to the publishers of the *Erie Daily Dispatch*, for the valuable assistance rendered to the Society, and particularly to Mr. J. A. Dupray, its accomplished associate editor, for the able and accurate report of the fair, that from day to day appeared in the columns of that paper.

Agreed to.

On motion, adjourned.

D. W. SEILER,
Recording Secretary.

HARRISBURG, *January 14, 1879, 2 o'clock, P. M.*

The last quarterly meeting of the Executive Committee was called to order by the Secretary, and in the absence of President Hammond, Mr. A. B. Hamilton was selected to preside.

The following members were present:

Messrs. McCrea, Blight, Kennedy, Branson, Barto, Waller, Tripp, Keller, Smull, Gehr, Rhey, McDowell, Abner Rutherford, Taylor, Zeigler, J. S.

Haldeman, Kapp, Eby, J. Rutherford, McConkey, Egle, Hugh Hamilton, and Seiler.

The minutes of the last meeting were read and approved.

Mr. **TRIPP** moved that the President appoint auditors to examine the accounts of the Treasurer, and also judge and tellers to conduct the annual election.

Which was agreed to.

The President appointed Messrs. Tripp, Branson, and Keller to audit accounts of Treasurer, and Messrs. Barto, Gehr, and McDowell to conduct the election.

The Committee on Publication were requested to report, and in the absence of the chairman, Mr. Kennedy, Mr. **SMULL** desired to make a verbal report:

He said the committee prepared the matter for the thirteenth volume, which was, in his judgment, of that character and substance as will be acceptable by this committee.

The Legislature passed an act to publish a volume to be called "The Agriculture of Pennsylvania," in which was to be printed the proceedings and essays of the State Board of Agriculture, Pennsylvania State Agricultural Society, State Dairymen's Association, Fruit Growers, and State College; giving to each organization a certain number of pages. This act was a compromise between all of these associations. The Committee on Publication, of which he was a member, was appointed to supervise the matter for this volume; this committee met several times in this city, discussing the subjects to be printed, and selected such essays as in their judgment was deemed best.

Mr. **KENNEDY** having arrived, stated that as chairman, he would be ready to present a written report in the evening, and moved that the report of the committee be postponed until that time.

Agreed to.

Letters from Messrs. Holstein and Murdoch were read, announcing their inability to be present at this meeting.

Mr. **SMULL** moved that the Corresponding Secretary be instructed to write to Ex-President Knox, expressing the sympathy of this committee with him in his sickness. Agreed to.

A letter from Mr. Murdoch in reference to a proposition from the Pittsburgh Exposition Company, and also one from the President of the Permanent Exhibition Company of Philadelphia, making inquiries as to the possibility of a joint exhibition, were read and referred to the Committee on location.

Mr. **McCREA** submitted the following:

To the President and members of the Executive Committee of the Pennsylvania State Agricultural Society:

GENTLEMEN: After a very agreeable association with you as a member of this committee, I desire to express, upon declining to serve any longer as an officer of the Society, my conviction that I can no longer render service of any value to the State of Pennsylvania or the cause of agriculture. Under the fostering care of this society, for a period of nearly thirty years, the county agricultural societies have been organized and developed to a point entirely self-reliant, and equal to sustain themselves.

To my apprehension, therefore, the field we for many years occupied and diligently cultivated has assumed an aspect leading to an entire change of policy to be hereafter pursued by the friends of agriculture disposed to continue their efforts to promote its interests.

I am ready to resign into other hands the future conduct of these interests, and tender my respectful resignation of the position of Vice President.

With best wishes for you all,

JAMES A. MCCREA, M. D., of Philadelphia.

Mr. KELLER moved that the above be accepted, with regrets of this committee.

Mr. SMULL. This coming from one of the oldest members of this committee, I would suggest its being referred to a committee for action.

Mr. RHEY moved that it be referred to the incoming committee. It is a matter for reflection, and if we accept, might do a great deal of injury to ourselves and to the Society we represent, and hoped that the matter would be deferred for the present.

Mr. MCCREA appreciated the compliments paid him by the members, but he had considered his action fully, and the Society, he thought, could select an able representative from his district, and the committee would confer a favor by accepting his declination.

Mr. KELLER'S motion was agreed to.

Mr. RHEY offered the following:

Resolved, The President of the Pennsylvania State Agricultural Society appoint a committee of three of its members to present to the Legislature of Pennsylvania the importance of enacting such laws as will secure to the farmers of the State the best result for their labors, among which we consider the appropriation of a sum sufficient to make a thorough practical trial of agricultural implements; a sum sufficient to pay the cost of securing the services of a competent chemist to tell us how to utilize economically the wasted manures of the State; to amend existing laws relating to our public roads, so as to secure good roads; to enact such law as will relieve the wool growers from the loss incident to the depredation of dogs; to enact such law as will secure accurate statistics of production, detailing the means used in the varied operations of husbandry.

Resolved, The failure in previous years to obtain any consideration for the measures proposed in the foregoing resolution, should admonish us to demand from the present Legislature, with increased earnestness, the prompt enactment of laws so essential to the interests of agriculture, the chief of our productive industries, employing two thirds of our people, and having invested, in all its varied operations, three times as much money as all our other industries, and the aggregate value of their products being in the same ratio.

Mr. WALLER. Mr. President, allow me to suggest that the word "amend" is scarcely applicable to our present road laws. A radical change is needed. Our present system may have been the best attainable at the period of its origin. Population was then sparsely scattered. Other demands for labor were more pressing. Pack horses were ordinary means of transportation, and the saddle was the palace car of the period. Ability to guide a plow should no longer distinguish a man as fit to locate and construct a public highway. Such viewers may be expected to follow fences and "old surveys" or water courses. Such supervisors distinguish themselves, and employ township labor in hauling earth upon the roadways for their successors to haul away.

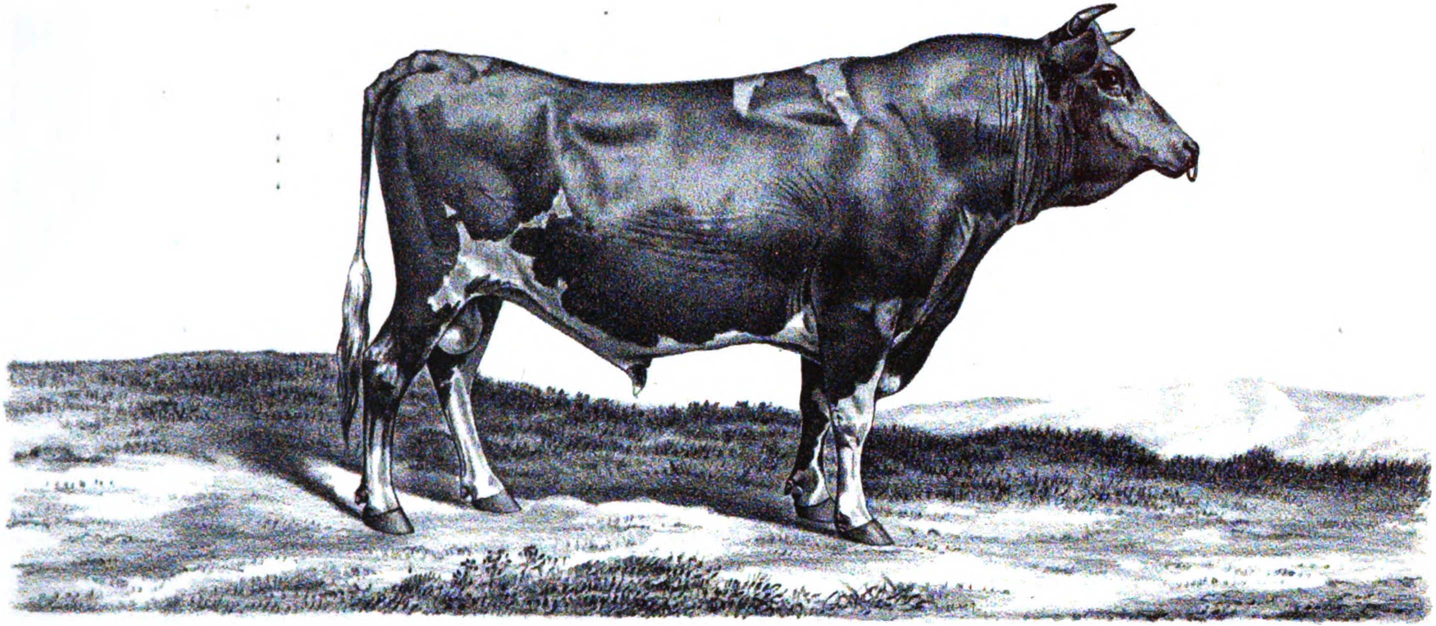
This is utterly discreditable to our present attainments in science and wealth. We need competent civil engineers to locate and construct our public roads, under the supervision of our courts. The best possible location may be considered permanent. The best grade may be determined, and the labor of successive years directed to its attainment. Then a road bed of solid substance and proper drainage will testify to the wisdom of our people, and like the old Roman roads, prove an abiding source of wealth. Science applied to common roads will as certainly repay the investment of public money, in the saving of the people's time and horse muscle, as railroad facilities will repay the large investments in their construction. Prejudice may stand, with loud-mouthed utterance, in the way of progress, and delay it for a time; but men are gifted with reason, and only burdened with prejudice.

As to the employment of "a chemist to tell us how to utilize wasted manures," it would seem an effort merely to increase our knowledge, which is already far in advance of our practice. The mover of the resolution has referred, by way of illustration, to the "six millions of pounds of human excrement per day" in this Commonwealth, largely wasted. The loss of over one hundred thousand tons of this most concentrated manure each year needs no chemistry to manifest its worse than folly. Carelessness among our people often makes the privy or the cesspool a source of poison to the water supply, and even to the atmosphere of the family. Diptheria and other typhoid diseases are often begotten of this stupidity. The modern *water-closet* is no security for health, with all its convenience and wastefulness. The fearful fatality of the National hotel disease, in Washington, some twenty years since, should have settled this question. Yet our large cities suffer stoically under the prevalence of malarial diseases. And the Queen of England, Empress of India, is a widow through the unquestioned agency of sewer gas.

Our people know that dry dust is a perfect disinfectant of human ordure. It will way them well to utilize that knowledge. Most people know, and all ought to know without being or paying chemists, that a few hundred pounds of ground gypsum, known largely as "plaster," will disinfect the ordure of a family, and render it as inoffensive to handle as garden soil. Experience enables me to speak practically upon these subjects. I have found great advantage in the constant use of gypsum, or sulphate of lime, in my horse stables. The known affinity of ammonia for sulphuric acid, teaches the farmer to arrest this volatile enemy of his horses eyes and feet, and lock it up as a most valuable element in his manure, by sprinkling his stable floor lightly and often with this "ground plaster."

We have something to learn, in our economy of manures, from the thrifty practical chemists of Japan, where the small farmer places an elegant vase of porcelain by the wayside, and solicits the wayfarer to relieve himself therein, for their advantage.

Mr. SMULL. I am of the opinion that at this time, and in the present condition of the State Treasury, it would be almost impossible to secure an appropriation, and if presented in the same bill will be defeated. As to the amount of time taken up by the Legislature on the subject of agriculture, I assert that last year, in a session of one hundred and forty-four (144) days, this subject occupied more time than any other. The road laws were presented in one or more bills, and in my judgment were well matured and proper laws. Objections to them came mostly from country members and representatives of the party by direction of the Executive Committee, and as one of the committee appointed to compare and prepare laws, I presented to the Legislature the bill to promote the planting of trees. This bill was reported unanimously by the Committee of Agriculture to the House, but it did not pass. The road law met with serious opposition; so with the sheep bill. Dogs, in my judgment, should be taxed; but when considered by two hundred representatives, great difficulty will be found to secure a



Jersey Bull

"CHELTON DUKE"

Owned by T.S. Cooper, Coopersburg, Pa.

FIRST PRIZE PENNSYLVANIA STATE FAIR, PHILADELPHIA 1879.

majority vote on this law. When this subject was before the Legislature it was defeated, the opposition coming from the representatives of the farmers. The difficulty, in my opinion, is to pass a *general law*, as both townships and counties wish to be exempt from the operations of these laws.

Mr. RHEY. The fact that the farmers of this State are supposed to be represented by this Society, and as one of this body I have annually suggested these and other laws which would inure to the benefit of the farmers, and have for years endeavored to secure such legislation and have laws enacted as will secure to the farmer the best possible results for his labor. It is universally admitted that the very foundation of success of the farmers, is the use of the most improved implements, and for this reason the aid of the State is requested in this resolution.

As we are the representatives of this great interest, is it not eminently proper for us to demand this, although failure may stare us in the face. We should not be derelict in our duty, and the effort should be renewed in order to show that we have done our duty as the representatives of the farming interests.

It seems to be conceded that Mr. Waller's suggestions for new road laws are good and proper; but if this can not be secured, let us by supplement change the present laws.

I have repeatedly suggested the contract system for roads; that is, to give the supervisors the power to contract for the construction of new, and the repairs of old roads, which would, I think, lessen the taxes to a very great extent.

The most important subject, that of wasted manure, is the least understood by the farmers. Of the four millions of inhabitants of this State, every one of whom consumes one and a half pounds of solid and liquid matter daily, possessing fertilizing properties of the highest order, I might say that not a fractional part is utilized. This, if saved, would amount to one thousand tons daily. In addition to this, the animals that die and are killed.

The census report of 1870, reveals the fact that in Pennsylvania the average *production* per acre in weight is about sixteen hundred (1600) pounds, while it is a well known fact that every farm properly cultivated and fertilized will yield at least five thousand pounds, or an increase of three hundred per cent.

If one person can produce the maximum result, every person can accomplish an equally good result by the use of the same means, and the aggregate value of farm products would be thereby increased three times as much as in 1870.

Better cultivation is the result of better implements; the increased crops so raised can be devoted to the rearing of animals, which gives the best food, and in my judgment sheep is that food. This branch, in my section, is the most productive. The destruction of sheep by dogs has, in many portions of the State, forced the farmers to abandon this particular branch, and to remedy this I am of the opinion that dogs should be taxed out of existence. This Society has at every session of the Legislature urged the importance of securing accurate reports and statistics, as will be shown by the bill as published in the eleventh volume of our transactions. This bill, as will be seen, instructs the chief of the Bureau of Statistics to arrange blanks, &c., and have the same reported to that official. The bill fully explains itself, and if carried out, we will arrive at some definite conclusion from the information so obtained, which will be highly beneficial to the interests we represent. These are all objects entitled to the gravest consideration of our Legislature.

Mr. **Keller**. I would like to know how the gentleman proposes to arrive at the best manner of saving manure.

Mr. **Rhey**. I propose that by the employment of a competent chemist, who shall make a thorough examination, and report for the benefit of agriculture.

Mr. **Keller** said part of the subject under discussion is the utilization of fertilizing substances; and as fertilization is the very essence of agriculture, it should engage the attention of every one feeling interested in the pursuit of farming, and, as already mentioned, human excrements are great and important items. Allow me to say, that probably there is no one substance that is so much neglected and lavishly wasted as this item. A great deal is deposited where the streams carry it away, befouling the water, while a large quantity is dropped into deep excavations, and, when full, burried, and left to poison the water of the neighboring wells, thereby causing diseases. Very frequently privies become so full and offensive that it is difficult to use them. If all privies were so constructed that a tub could be placed under them, and of easy access, these befouling substances could be easily removed. There are persons who would gladly do it at their own expense; thus husbanding and applying to the soil what is now lavishly wasted. But before this item can be made generally available as a fertilizer, prejudices must be laid aside, and the fact that what is manure one year is bread the next must be understood.

All fertilizers are offensive and disagreeable in the condition in which they are applied, but plants do no more assimilate them in that form than a man would, but after passing through the earth, natures laboratory, a pure liquid is the result, and in this form plants feed themselves on fertilizers applied. After a thorough mixing with absorbents, such as plaster, fine coal ashes, dry pulverized muck, or fine earth, human excrements become less offensive to handle, and their value is increased, the volatile portion being held in readiness for the plants.

Mr. **Smull** believed it time for the farmer to drop his prejudice in this respect—many of them refusing to make use of human excrements. In 1854, I started to utilize all this matter, and although favorably located, have never had a cesspool. My arrangement is simple and complete. I had a box made with a hinged top, and whenever full the farmer would hitch his horse to a staple, in one side, and draw it to the ground, where it was prepared. I move that this subject be referred to the incoming Executive Committee.

Agreed to.

On motion, adjourned.

HARRISBURG, *January 15, 1879.*

The annual meeting was called to order.

On motion of Mr. Barto, Mr. Smull was elected to preside.

The hour of 10 o'clock having arrived, the judge and tellers appointed to conduct the election proceeded with that duty.

Mr. A. B. Hamilton offered the following:

That the article in section three of the constitution of this Society, relative to the election of Recording Secretary and Treasurer by the members of this Society, be so amended as to make those officers elective by the Executive Committee, and all amendments making the same elective by the members of this Society be and is hereby repealed.

Mr. **SEILER** objected to a change in the election of the officers of this society, believing that the proper persons to select the officers were the members of the Society. If the Executive Committee should control this matter, they also should control the election of other officers. The change in the constitution was made in 1876, upon his motion, in order to give to the members the selection of all the officers.

Mr. **WALLER** moved that the resolution be postponed until the January meeting in 1880.

Agreed to.

Mr. **KENNEDY** offered the following:

WHEREAS, Institutions for the reformation of juvenile offenders, supported, in whole or in part, by appropriations of public money, exist without provision within their grounds for the employment of their inmates in agricultural labor;

Whereas, The experience of civilized nations has shown that such labor is the best calculated to further the true objects of such institutions;

Resolved, That the Legislature be petitioned to require managers of such institutions to make ample provisions, at the earliest practical day, for the employment of their inmates in agricultural pursuits.

Which, after considerable discussion, was recommended to the favorable consideration of the incoming Executive Committee.

The hour of twelve o'clock having arrived, the President declared the polls closed, and the officers reported as follows:

HARRISBURG, *January 15, 1879.*

The undersigned appointed officers to conduct the annual election, report the vote as follows:

President—William S. Bissell.

Vice Presidents—1. Archibald R. Montgomery; 2. George Blight; 3. A. L. Kennedy; 4. W. H. G. Adney; 5. A. D. Levering; 6. David H. Branson; 7. William H. Holstein; 8. Tobias Barto; 9. S. S. Spencer; 10. Daniel H. Neiman; 11. D. J. Waller; 12. Ira Tripp; 13. J. S. Keller; 14. John A. Smull; 15. James E. Carmalt: 16. F. A. Allen; 17. John A. Lemon; 18. John S. Miller; 19. Daniel O. Gehr; 20. L. A. Mackey; 21. George Rhey; 22. John Murdoch, junior; 23. W. W. Speer; 24. John McDowell; 25. J. B. Lawson; 26. J. D. Kirkpatrick; 27. S. E. Kincaid.

Additional Members Executive Committee—A. Wilhelm, Abner Rutherford, William Taylor, John H. Ziegler, W. B. Culver.

Ex-Presidents Members of the Board—Frederick Watts, D. Taggart, Jacob S. Haldeman, Thomas P. Knox, A. Boyd Hamilton, Amos E. Kapp, John C. Morris, J. R. Eby, John W. Hammond.

Corresponding Secretary—Elbridge McConkey.

Recording Secretary—D. W. Seiler.

Treasurer—John B. Rutherford.

Chemist and Geologist—S. S. Haldeman.

Assistant Chemist and Geologist—Hugh Hamilton.

Librarian—William H. Egle.

Each having received seventy (70) votes.

TOBIAS BARTO,
Judge.
D. O. GEHR,
JOHN McDOWELL,
Tellers.

The auditors appointed to examine the accounts and vouchers of the Treasurer, made the following report; which, on motion of Mr. **RHEY**, was approved and filed:

JOHN B. RUTHERFORD, *Treasurer, in account with Pennsylvania State Agricultural Society.*

DR.

To balance in treasury,	$2,478 63	
To life memberships, James Miles, E. C. Brown, and Silas A. Rutherford,	30 00	
To cash for interest on loan,	30 28	
To sale of annual memberships, single admissions, &c., at Erie, Pa.,	6,177 66	
To State appropriation,	2,000 00	
		$10,716 57

CR.

By rent of office, Harrisburg, Pa.,	$250 00	
By printing,	946 04	
By expenses Executive Committee,	978 48	
By expenses Secretary's office,	744 54	
By expenses Treasurer's office,	473 61	
By premiums, 1877,	22 00	
By premiums, 1878, and essay,	3,405 00	
By medals,	235 17	
By superintendence,	512 80	
By preparations of grounds ,labor, and carpentry,	581 93	
By forage,	318 00	
By transportation,	175 72	
By police,	277 00	
By entertainment of committees,	275 00	
By salary of Recording Secretary,	500 00	
By salary of Corresponding Secretary,	500 00	
By salary of Treasurer,	250 00	
By balance,	271 28	
		$10,716 57

The undersigned committee, appointed to audit the accounts of the Treasurer, report that they have examined the vouchers, compared the accounts, and find the same correct.

IRA TRIPP,
J. S. KELLER,
DAVID H. BRANSON,
Committee.

On motion of Mr. Tripp, the meeting adjourned.

D. W. SEILER,
Recording Secretary.

HARRISBURG, *January 15, 1879, 2 o'clock, P. M.*

The newly elected Executive Committee was called to order in the absence of Mr. Bissell, the President, and on motion of Mr. Branson, Mr. Smull was selected to preside.

The following members were present:

Messrs. Blight, Kennedy, Branson, Barto, Waller, Tripp, Keller, Gehr, Rhey, McDowell, Kincaid, Abner Rutherford, Taylor, Zeigler, A. B. Hamilton, Kapp, Morris, Eby, McConkey, J. B. Rutherford, Egle, and Seiler.

The report of the Committee on Election was read.

Mr. KENNEDY, chairman of the Committee on Publication, read the following report:

HARRISBURG, *January 14, 1879.*

To the President and members of the Pennsylvania State Agricultural Society:

GENTLEMEN: Your Committee of Publication begs leave respectfully to report, that agreeably to its appointment it early entered upon the work of preparing the volume of the Society's transactions, now in the hands of the binder.

The volume contains, as usual, the minutes of the meetings of the Society and of the Executive Committee, the reports of the officers and of the standing and special committees, and the reports of the judges of the Society's exhibition, all of 1878. Also, engravings of prize animals, a detailed description of the exhibition, and articles on subjects of agricultural interest. The selection of these subjects was an embarassing duty. The act relating to the publication of the Society's transactions, passed at the last session of the Legislature, provides that the proceedings of three other organizations be published in one volume. These organizations are the Pennsylvania Board of Agriculture, the Pennsylvania Fruit Grower's Society, Pennsylvania Dairymen's Association. Without some understanding among these organizations, and especially between the State Board and this Society, there is reason to apprehend that the writers of essays for the two bodies would treat the same subjects, repeat the same facts and arguments, and by filling the volume with vain repetitions and few topics, exclude others of equal importance. The field of agriculture is wide enough for all four organizations to work in, without elbowing each other, if each agree to do its own share of the work. The extent of each share to be defined by conference committees. An equitable division of the topics to be written up by the essayists of each organization if made by a joint committee would insure attention to all the branches of agriculture pursued in Pennsylvania, and their proper treatment in the joint volume published by the State.

These views were fully communicated by letter from the chairman of this committee to the Secretary of the State Board, and although no joint committee of the two bodies was held, yet it is believed that the correspondence has opened the way for such conference. Your committee has, therefore, been compelled to select articles to appear in your transactions without any knowledge of the articles selected by your three sister organizations for a similar purpose, a dilemma which it is hoped will not exist again. Let but the relation between your body and the three just mentioned be established, and a generous rivalry in the promotion of agriculture will follow, to the great improvement of all the departments of the art.

The hope of effecting some great arrangement in the selection of topics, led to their selection for your portion of the volume, and has led to its being less full than it should be. The use of solid, instead of leaded type, formerly employed, renders the quantity of matter seemingly much less than that of last year, while in reality nearly equals it. The material it is believed will be found superior.

ALFRED L. KENNEDY, *Chairman,*
JNO. A. SMULL,
ELBRIDGE MCCONKEY,
D. W. SEILER,
DAVID H. BRANSON.

Which, on motion of A. B. HAMILTON, was accepted, and the committee continued for the present year.

Mr. SMULL explained the nature of the act as passed.

Mr. HAMILTON moved that a copy of the Thirteenth volume be forwarded by the Corresponding Secretary to each member of the committee.

Which was agreed to.

The resolution submitted to the Society's meeting by Mr. Kennedy, and which was recommended to the incoming Executive Committee, for their consideration, being in order,

Mr. RHEY moved that the same be approved and adopted, and that a committee be appointed to prepare a petition in harmony with the suggestions embraced in the resolution, to be presented to the Legislature, said petition to be properly attested by the officers of this Society.

Mr. McDOWELL would very much like to vote for this proposition. The difficulty in his mind was to specify the kind of labor the female portion should be given.

Mr. HAMILTON thought that if a committee was appointed, they had better make a thorough examination of the laws before they acted in this matter.

Mr. KENNEDY. There is nothing in this resolution that requires much explanation. There is no one present who will dispute the fact that agricultural labor is reformatory in its character; that, as compared with the work-bench, the plow is a great reformer. When a man is brought into contact with nature, he is elevated. He deprecated the system of keeping boys and girls at the work-bench as a bad one. As to the western district, if the result was not beneficial, in his judgment it was from the want of proper treatment and management. The House of Correction in Philadelphia has recently added agricultural employment to its labor system, and it has proved a great success. In Great Britain agricultural pursuits are the rule. There is no difficulty for the working of the boys on the farm. The girls—educate them in horticulture. Let it be all that the term agriculture means. It is not known whether we will have a law making education compulsory, but in case such a law is passed, delinquents will have to be cared for; and in this case a farm should be attached to the school in order to give the boys and girls work of this kind. The principal employment now in the House of Refuge is the making of match boxes and brushes.

Mr. RHEY. Doctor Kennedy has evidently given this subject much thought and attention, and I fully coincide with his views. This would not interfere with the moral training, but benefit it. Assuming that this committee are the representatives of two thirds of the people of this State, and coming from us the Legislature should give this their consideration and best efforts. We do not, nor have we any desire to dictate, but suggest this as a proper subject for their consideration.

The resolution was agreed to.

Mr. RHEY:

Resolved, That the Treasurer be and is hereby authorized to borrow, in the name of this Society, a sum of money not to exceed five hundred (500) dollars, for the use of this Society, giving his note with the seal of this Society attached thereto; also a copy of this resolution to attest the same.

Agreed to.

Mr. HAMILTON:

Resolved, That a resolution and its proposed amendments, referred to the Society at their next annual meeting, be committed to a select committee consisting of Messrs. Waller, Egle, and Gehr for examination. That said committee report, at the last quarterly meeting of this Society in 1880, such forms of questions as may be proper to submit to the Society, and ask its acquiescence in the same. That the sub-committee shall meet at the time and place of the next annual exhibition.

Mr. EGLE offered the following:

Resolved, That the President appoint a committee of five, (5), to consist of the President, the two Secretaries, and two members of this Executive Committee, to whom shall be delegated full power to make such changes in the premium lists, the location of the next annual exhibition, the rules and regulations governing the same, and to have full authority in all matters relating to this Society, as now given to this Executive Committee.

Mr. HAMILTON moved to strike out five (5) and insert three, (3.) Not agreed to.

The original motion was agreed to.

Committee, Messrs. Bissell, Morris, Egle, Kennedy, McConkey, and Smull.

Mr. KENNEDY offered the following resolution, which was adopted:

Resolved, That a committee be appointed to inquire and report to this committee by what means the school system of Pennsylvania can be made useful as a means of diffusing information on the subject of principles and practice of enlightened agriculture through the rural districts of the State.

Also, the following, which was adopted:

Resolved, That the Committee on Publication be instructed to have prepared for the next volume of the Society's transanctions an article adapted to the growth of the cranberry, and describing the methods of irrigating the plant pursued in cultivation.

Mr. EBY moved that the Committee on Legislation be continued, and that they present to the Legislature the bill for the planting of trees, which was recommended by this Society at its last meeting.

Agreed to.

Mr. RHEY:

Resolved, That the President appoint a committee of two members to ascertain and report the possibility of increasing the destruction of insects detrimental to vegetable life, and further limiting the killing of insectiverous birds.

Agreed to.

Messrs. McDowell and Morris were appointed the committee.

Mr. MCDOWELL. The show of sheep made at the Centennial Exposition was not satisfactory to the sheep raisers or wool growers of this State and country. This State being central, I think that at our next exhibition, if inducements are held out to them, we could have a display that in itself would be worthy of this State.

Mr. HAMILTON offered the following:

Resolved, That Mr. McDowell, Vice President from the Twenty-fourth district, be authorized to correspond with the wool growers and sheep breeders of the United States, with the view of securing an exhibition of sheep from every State in the Union at our next annual exhibition.

Agreed to.

On motion, adjourned.

D. W. SEILER,
Recording Secretary.

REPORTS OF COMMITTEES AND LIST OF AWARDS.

Twenty-sixth Annual Exhibition, held at Philadelphia, September, 1879.

HORSES—Sweepstakes.

PHILADELPHIA, *September 15, 1879.*

To WILLIAM S. BISSELL, Esq.,
President State Agriculture Society:

SIR: Your committee respectfully report that they labored under great difficulty in deciding between the excellent display of wonderful draft horses and superb carriage horses entered for competition under this class, but after careful examination and mature deliberation, in Group I, Class 1, Premium List No. 1, they award the prizes as follows:

1. For best stallion on exhibition, of any breed, to Joseph B. Baker, junior, Ingleside, Chester county, "Inkermann," $200
2. For best four horses, comprising one stallion and three of his get, under four years, to William T. Walters, Baltimore, Maryland, stallion, "Prince," and three of his get, ... 150

(Signed)
JAMES E. CARMALT, *Chairman.*
CHARLES H. MULLEN,
J. I. BISHOP,
LEWIS LUSSON,
GEORGE ASHBRIDGE,
D. O. GEHR,
L. H. TWADDELL,
A. E. KAPP,
Committee.

CLASS 1—THOROUGH-BRED HORSES, MARES, AND COLTS.

Your judges, in Class 1, report that they award as follows:

To P. J. Stewart, Boot Tavern, Chester county, best thorough-bred stallion, "Reviler," first premium, ... $100
Dr. Thomas C. Stellwagen, Media, second best thorough-bred stallion, "Mattoon," second premium, ... 50
Same. Thorough-bred filly, two years, second premium, ... 15
Your judges further recommend a discretionary premium to James Glover & Co., Leeds, England, for imported Cleveland bay stallion, "Liberal," three years 40
Also, imported Cleveland bay stallion, "Sportsman," two years, . . . 20

And further recommend that Class 1 of your premium list be expunged, and united with Class 2, with such modifications as your committee will suggest in that report.

JAMES E. CARMALT,
A. E. KAPP,
Committee.

CLASS 2—FINE BRED HORSES, MARES, AND COLTS.

The judges in Class 2 respectfully report that they award premiums in this class as follows:

To McKeen & Hulick, Easton, stallion, "Eddystone," six years, first premium,	$100
J. B. Baker, junior, Ingleside, Chester county, stallion, "Inkermann," nine years, second premium,	50
Samuel Wilson, Abbey Hotel, Twenty-eighth ward, Philadelphia, stallion, "Fleet Medium," four years, first premium,	60
George Ashbridge, West Whiteland, Chester county, stallion, "Sir Charles," four years, second premium,	30
H. N. Smith, Trenton, New Jersey, stallion, "Jimmie Gould," three years, first premium,	50
F. Y. Clopper, Greensburg, Pennsylvania, stallion, "Saturn," second premium,	25
M. T. Warne, Easton, stallion, "Warne's Hambletonian," three years, the last of the get of "Rysdyk's Hambletonian, special premium,	50
John Hunter, West Philadelphia, stallion colt by "General Knox," two years, first premium,	30
Louis M. Lusson, Ardmore, stallion colt, "Trust," two years, second premium,	15
John Hunter, West Philadelphia, stallion colt by "General Knox," one year old, first premium,	20
Chalkley B. Zelley, Moorestown, New Jersey, stallion colt by "Performer," one year, second premium,	10
Charles Lafferty, West Philadelphia, brood mare, by "Edwin Forrest," nine years, with foal at her foot, by "General Washington," first premium,	60
John Patterson, Glenmore, Chester county, brood mare, over four years, "Evening Star," first premium,	50
J. B. Baker, junior, Ingleside, Chester county, brood mare, over four years, "Hannah Inkermann," second premium,	30
Charles L. Sharpless, Philadelphia, brood mare, over four years, "Sparkle," second premium,	25
Samuel Wilson, Abbey Hotel, Twenty-eighth ward, Philadelphia, filly, "Happy Maid," three years, first premium,	40
J. B. Baker, junior, Ingleside, Chester county, filly, "Sis," three years, second premium,	20
Charles L. Sharpless, Philadelphia, filly, "Lottie Knox," two years, first premium,	30
Dawson Thompson, Shoemakertown, filly, by "Draco," two years, second premium,	15
Charles L. Sharpless, Philadelphia, filly, "Pearl," one year, first premium,	20
J. B. Baker, junior, Ingleside, Chester county, filly, by "Inkermann," one year, second premium,	10

Your committee respectfully suggest that the premium list be so arranged in the future that this department be divided into two classes—a carriage class, in which all mature horses shall exceed fifteen hands and three inches in height, and a roadster class below that, not less than fourteen hands and two inches, with such premiums to stallions and their get as your committee shall deem best.

(Signed,)

JAMES E. CARMALT,
CHARLES. H. MULLEN.
A. E. KAPP

NOTE.—The Executive Committee award premiums in the foregoing class as follows:

To Samuel Wilson, Abbey Hotel, Twenty-eighth ward, Philadelphia, stallion, "Wilson's Trafalgar," six years, diploma.

Cyrus Lukens, Philadelphia, brood mare, "Queen Daisy," with foal at her foot, by "Thomas Jefferson," diploma.

R. D. Cummings, 15 South Fourth street, Philadelphia, mare, "Madge," diploma.

William H. Hacker, 15 North Fourth street, Philadelphia, filly, "Fannie," diploma.

Daniel McCauley, Philadelphia, mare, "Natta Maiden," diploma.

CLASS 3—DRAUGHT HORSES, MARES, AND COLTS.

Your committee in this class respectfully report, that the entries in this department were of an unusually superior character, embracing a large variety of very superior animals, both imported and the descendants of imported animals, on both sides, and that their conclusions were arrived at only after a long and thorough examination.

The awards are herewith respectfully submitted:

To William D. Althouse, Reading, Percheron stallion, "Grey Chief," seven years, first premium,	$75
Eli Chambers, Latrobe, imported Clydesdale stallion, "Surprise," seven years, second premium,	40
Joseph Glover & Co., Leeds, England, imported Clydesdale stallion, "Modern Type," four years, first premium,	50
Charles Board, London, England, imported Lincolnshire draught stallion, "Tip Top," three years, first premium,	40
W. T. Walters, Baltimore, Maryland, Percheron stallion, "Hannibal," three years, second premium,	20
William Steel, Greensburg, Clydesdale stallion, "Never Mind Him," two years, first premium,	30
W. T. Walters, Baltimore, Maryland, Percheron brood mare, "Nellie," nine years, first premium,	40
James Steel, Greensburg, brood mare, with foal at her foot, first premium,	50
W. S. Holstein, Pastel, brood mare, with foal at her foot, second premium,	25
Eli Chambers, Latrobe, filly, special premium,	10

(Signed)

TOBIAS BARTO,
H. B. BRUNER,
D. O. GEHR,
J. I. BISHOP,
Committee.

CLASS 4—HARNESS AND SADDLE HORSES.

The judges in Class 4 respectfully report that in the premium list class for harness and saddle horses we award premiums as follows:

Wilson Brothers, Huntingdon, one pair mares for light harness, first premium,	$50
John Hunter, West Philadelphia, b. g. roadster, "Longfellow," first premium,	40
J. H. Burgin, Germantown, gelding, "Dick," second premium,	20
Joseph W. Vanleer, Philadelphia, saddle mare, "May Queen," first premium,	40

J. F. Keen, junior, 1209 Arch street, Philadelphia, saddle gelding, second premium,	20
Wilson Brothers, Huntingdon, Hambletonian mare, by "Warwick," premium,	20
John Hunter, West Philadelphia, Shetland pony, "Clip," first premium,	15
W. P. Dolby, West Philadelphia, pony, "Scotland," second premium, (vacated,)	10

Your committee respectfully report that they have had much difficulty in forming any opinion of the action of the horses submitted to them, for want of a proper place for the exercise of animals. No respectable farmer in the State, having colts of good action, would trust to have them auctioneered in such a place as has been provided for the fair.

(Signed) James E. Carmalt,
Charles H. Mullen,
A. E. Kapp.

CATTLE—Sweepstakes.

The undersigned, appointed to award the sweepstakes premium for cattle of any breed, make the following report:

There were five competitors. David Selsor, of London, Ohio, and F. Y. Clopper, of Greensburg, entered Short Horns; James Young, of Middletown, and Charles L. Sharpless, of Philadelphia, entered Jerseys; and William M. Singerly, of Philadelphia, entered Holsteins. It is almost superfluous to say that all the herds were of great merit and high value.

On the first ballot, Messrs. Miller, McDowell, and Haldeman (three) voted for Selsor's herd; Messrs. Taggart and Tarbell (two) for James Young; and Messrs. Vogdes and Cooper for Charles L. Sharpless.

On the second ballot, Messrs. Miller, McDowell, Haldeman, Vogdes, and Cooper (five) voted for Selsor's herd; Messrs. Taggart and Tarbell (two) for James Young's herd.

Mr. Selsor's herd, having a clear majority, is therefore entitled to the premium, as best thoroughbred herd on exhibition—$200.

(Signed,) David Taggart, *Chairman*,
John S. Tarbell,
J. S. Haldeman,
T. S. Cooper,
William H. Vogdes.
John McDowell,
John M. Miller.

CLASS 6—Short Horns.

Sub-Class A.

Registered in Allen's, Alexander's and the English Herd Book.

To David Selsor, London, Ohio, best herd on exhibition,	$100
Same. Best bull, three years and over, "London, Duke of Greenwood," first premium,	50
William Steel, Greensburg, second best bull, three years and over, "Prince Van Metre," second premium,	25
F. Y. Clopper, Greensburg, best bull, two years and under three, "Duke of Skara Glen," first premium,	40
George Ashbridge, West Whiteland, second best bull, two years and under three, "Quinton," second premium,	20

A. P. Lewis, Media, best bull, one year and under two, “Eighth Duke Wheatland,” first premium,	30
F. Y. Clopper, Greensburg, second best bull, one year and under two, “Second Duke of Skara Glen,” second premium,	15
David Selsor, London, Ohio, best cow, four years and over, “Profitable Ninth,” first premium,	40
L. H. Long & Son, Maysville, Kentucky, second best cow, four years and over, “Duchess of Mason,” second premium,	20
David Selsor, London, Ohio, best cow, three years and under four, “Profitable Twelfth,” first premium,	30
L. H. Long, Maysville, Kentucky, second best cow, three years and under four, “Mary Leslie,” second premium,	20
F. Y. Clopper, Greensburg, Pennsylvania, “Maid of Skara Glen Third,” second premium,	15
David Selsor, London, Ohio, best heifer, two years and under three, “Profitable Fourteenth,” first premium,	25
Same. Second best heifer, two years and under three, “Greenwood Louan Thirty-fourth,”	15
William Steel, Greensburg, best heifer, one year and under two, “Fourth Constance of Hannaston Farm,” first premium,	20
David Selsor, London, Ohio, second best heifer, one year and under two, “Profitable Fifteenth,” second premium,	10

Sub-Class B.

May be unregistered, but either imported or descended from imported animals only.

David Selsor, London, Ohio, best cow, four years and over, “Profitable Eleventh,” first premium,	$30
Same. Second best cow, four years and over, “First Belle Duchess of Greenwood,” second premium,	20
L. H. Long & Son, Maysville, Kentucky, best cow, three years and under four, “White Princess,” first premium,	20

NOTE.—The bull, “Red Rose,” third, one year, owned by Jacob H. Hostetter, Littlestown, would have received second premium, but for black nose, in awards for bulls one year and under two.

Your committee respectfully report, that they have used their best judgment in awarding the premiums, and would have much preferred to have divided the premiums among the herds of their own State, could they have done so honestly. They have seen a decided improvement in the Short Horn breed within the last year in the State of Pennsylvania, and will say that they did not see one inferior animal of this breed on exhibition.

We could recommend any one wishing to purchase Short Horn cattle to breed from, for milk or beef, to apply confidently to either of the breeders who have this kind on exhibition, and they will secure the best in the country.

(Signed)
JOHN C. MORRIS, *Chairman*,
T. S. COOPER,
JOHN S. TARBELL,
H. MILLER,
WILLIAM H. VOGDES.

CLASS 7—DEVONS.

D. & J. Banker, Franklin Forks, Susquehanna county, best herd on exhibition,	$100

J. M. Miller, Hickory, Washington county, best bull, three years and over, "Barrister," first premium,	50
J. B. Longenecker, Union Deposit, Dauphin county, second best bull, three years and over, "The President," second premium,	25
D. &. J. Banker, Franklin Forks, best bull, "Prince of Wales Nineteenth," one year old and over, first premium,	30
J. B. Longenecker, Union Deposit, second best bull, one year and over, "Duke of Dauphin," second premium,	15
D. & J. Banker, Franklin Forks, best cow, four years and over, "Edith Fifth," first premium,	40
J. M. Miller, Hickory, second best cow, four years and over, "Belle Patterson Sixth," second premium,	20
Same. Best cow, three years and under four, "Belle Flora Ninth," first premium,	30
D. & J. Banker, Franklin Forks, second best cow, three years and under four, "Belle Eighth," second premium,	20
J. M. Miller, Hickory, best heifer, two years and under three, "Rena Fourteenth," first premium,	25
D. & J. Banker, Franklin Forks, second best heifer, two years and under three, "Bright Promise Second," second premium,	15
Same. Best heifer, one year and under two, "Rose of Baltimore first," first premium,	20
J. B. Longenecker, Union Deposit, second best heifer, one year and under two, "Helene," second premium,	10

(Signed) JOHN. C. MORRIS, *Chairman*,
T. S. COOPER,
W. H. VOGDES,
JOHN S. TARBELL,
H. MILLER.

CLASS 8—HOLSTEINS, HOLSTEIN.

William M. Singerly, Philadelphia, best herd Holstien cattle,	$100
Same. Best bull, three years and over, "Oneida Chief," first premium,	50
Same. Best bull, two years and over, "Aurora," first premium,	40
Same. Best cow, four years and over, imported, "Karimo," first premium,	40
Same. Second best cow, four years and over, "Vineta," second premium,	20
Same. Best cow, three years and over, imported, "Letta," first premium,	30
Same. Best heifer, two years and over, "Jenny," first premium,	25
Same. Second best heifer, two years and over, imported, "Dairy Maid," second premium,	15
Same. Best Holstein heifer, one year and under two, imported, "Antjeal," first premium,	20
Same. Second best Holstein heifer, imported, "Gretje," second premium,	10

Your committee respectfully report that there was but one herd of this breed in the building, while those of the thorough-bred breeds of other varieties were largely represented. This herd was, however, of fine quality, eight of the thirteen animals on exhibition having been imported by the owner.

(Signed) JOHN C. MORRIS,
T. S. COOPER,
W. H. VOGDES.

CLASS 9—AYRSHIRES.

T. S. Cooper, Coopersburg, best Ayrshire herd,	$100
Same. Best bull, three years and over, "The Pretender," first premium,	50
Louis Jack, Media, best bull, two years and under three, "Spruce," first premium,	30
Same. Best cow, four years and over, imported, "Queen Mary," first premium,	40
Same. Second best cow, four years and over, "Rosa Loring," second premium,	20
Thomas T. Tasker, senior, Philadelphia, best heifer, "Lady Fleming Second, two years, second premium,	25
Same. Second best heifer, two years, "Avondale Beauty Second," second premium,	15
Louis Jack, Media, best heifer, one year, "Jennie Darden," first premium,	20
Same. Second best heifer, one year, "Girl of Promise," second premium,	10
Cloud & Son, Kennett Square, six Ayrshire calves, "Happy Family," special first premium,	15

Your committee respectfully report the foregoing decisions.

JOHN C. MORRIS.
W. H. VOGDES.

CLASS 10—JERSEYS.

The Committee on Jersey cattle make the following report:

There were nine herds of Jerseys entered for competition, and three of the Guernseys. Most of the famous herds in the vicinity besides were represented in part, and the number of herds that came under their inspection amounted to one hundred and twenty head.

Mr. Charles L. Sharpless, Mr. James Young, of Middletown, Mr. Samuel J. Sharpless, Mr. W. Massey, Mr. W. Barnett, Mr. Colin Cameron, representing G. D. Coleman's estate, Mr. Silas Betts, Mr. Charles Lafferty, and Mrs. Martha McIlvaine, all sent herds.

After very careful inspection, they make the following award:

Mr. James Young, Middletown, best herd of Jersey cattle, consisting of one bull and four cows, herd premium,	$100
T. S. Cooper, Coopersburg, best bull, three years and over, "Chelton Duke," first premium,	50
Charles L. Sharpless, Philadelphia, second best bull, three years and over, "Comet of Marlborough," second premium,	25
Samuel J. Sharpless, Street Road, "Lenape," best bull, two years and over, first premium,	40
Mrs. Hugh McIlvaine, Philadelphia, "Boswell," second best bull, two years and over, second premium,	20
Samuel J. Sharpless, Street Road, "Alroy," best bull, one year and over, first premium,	30
Mrs. Hugh McIlvaine, Philadelphia, "Nigel Bruce," second best bull, one year and over, second premium,	15
T. S. Cooper, Coopersburg, "Lady Mary," best cow, four years and over, first premium,	40
John Yewdall, Philadelphia, "Fidelia," second best cow, four years and over, second premium,	20

Samuel J. Sharpless, Street Road, "Esther of Lenape," best cow, three years and over, first premium,	30
William Barnett, Lionville, "Belle of Uwchland," second best cow, three years and over,	20
John I. Bishop, Bordentown, New Jersey, second best heifer, between two and three years, "Mignonne," second premium,	15
T. S. Cooper, Coopersburg, best heifer, between one and two years, "Bessie Hinnen," first premium,	20
Henry Palmer, Chester, second best heifer, between one and two years, "Lucy C.," second premium,	10
William Massey, Philadelphia, special premium, "Sadie Bismarck," five years,	25
James Young, Middletown, special premium, "Pride of the Farm," five years,	25
Colin Cameron, Brickerville, special premium, cow,	25
W. R. Williams, Falls of Schuylkill, special premium, "Black Prince," bull, three years,	20

Much of the other stock exhibited was very fine, but too numerous to mention, and were much admired by your committee, who only regret they had not premiums to award them.

(Signed) GEORGE BLIGHT,
LOUIS M. LUSSON.

CLASS 11—GUERNSEYS.

The committee of Guernsey cattle, report that there were three herds exhibited, but they withhold the premium for the "best herd," as, in their judgment, neither of those exhibited contained animals that entitled them to this award.

We awarded single premiums as follows:

James Logan Fisher, Philadelphia, best bull, between two and three years, "Young Duke," first premium,	$40
Henry Palmer, Chester, "Jeweller," best bull, under two years,	30
Same. "Daisy," best cow, three years, first premium,	30
James Logan Fisher, Philadelphia, "Imported Queenie," second best cow, three years, second premium,	20
Same. Second best heifer, between one and two years, "Princess Second," second premium,	15

(Signed) GEORGE BLIGHT,
LOUIS M. LUSSON.

CLASS 12—FAT CATTLE.

Sub-Class O—Grade Cows.

George Ashbridge, West Whiteland, one cow, three years, second premium,	$10
Same. Heifer, between one and two years, second premium,	10

The judges did not deem that the cows were of a character to entitle them to the first premium, and have, therefore, awarded them second premiums only.

J. S. KELLER,
JOHN S. TARBELL,
Committee.

Your committee found, that after finishing their awards, Mr. Thomas

Bradley, of Philadelphia, had placed on exhibition, but not for competition, ten head of very superior three-year old fat Short Horn cattle, which were of the very finest quality, and reflect great credit on his judgment and enterprise.

Sub-Class B—Cows and Heifers by Thoroughbred Sires.

J. L. Miller, Wallingford, Ayrshire heifer, "Julia," one year, first premium,	$25
George Ashbridge, West Whiteland, Short Horn cow, eight years, second premium,	15
L. H. Long & Son, Maysville, Kentucky, Short Horn cow, "Flora," four years, first premium,	25

Your committee respectfully report, the foregoing decision is unanimously approved.

(Signed)
JOHN C. MORRIS,
T. S. COOPER,
W. H. VOGDES.

GROUP III—SHEEP.

To the President and Gentlemen of the State Agricultural Society:

The undersigned committee, appointed to view the sheep entered for the various prizes offered by your Society, at its annual exhibition, held September 8 to 20, inclusive, at Philadelphia, make the following report:

Knowing the importance of a careful examination, which they believed could be better made by the scale of points as laid down in the *United States Sheep Breeders' Register*, they therefore agreed to adopt it as the order of examination. The scale is as follows, (with explanation:)

1. Blood.—A perfectly authenticated line of ancestry, extending to one or more importations of Merino sheep from Spain, made prior to 1812, without admixture of any other blood—twenty points.

2. Constitution.—This is indicated by a healthful countenance; expanded nostrils; short, strong neck; deep chest; round barrel; short, strong back, strong loin; heavy bone of fine texture; muscle fine and firm; skin thick, soft, and of a pink color—eighteen points.

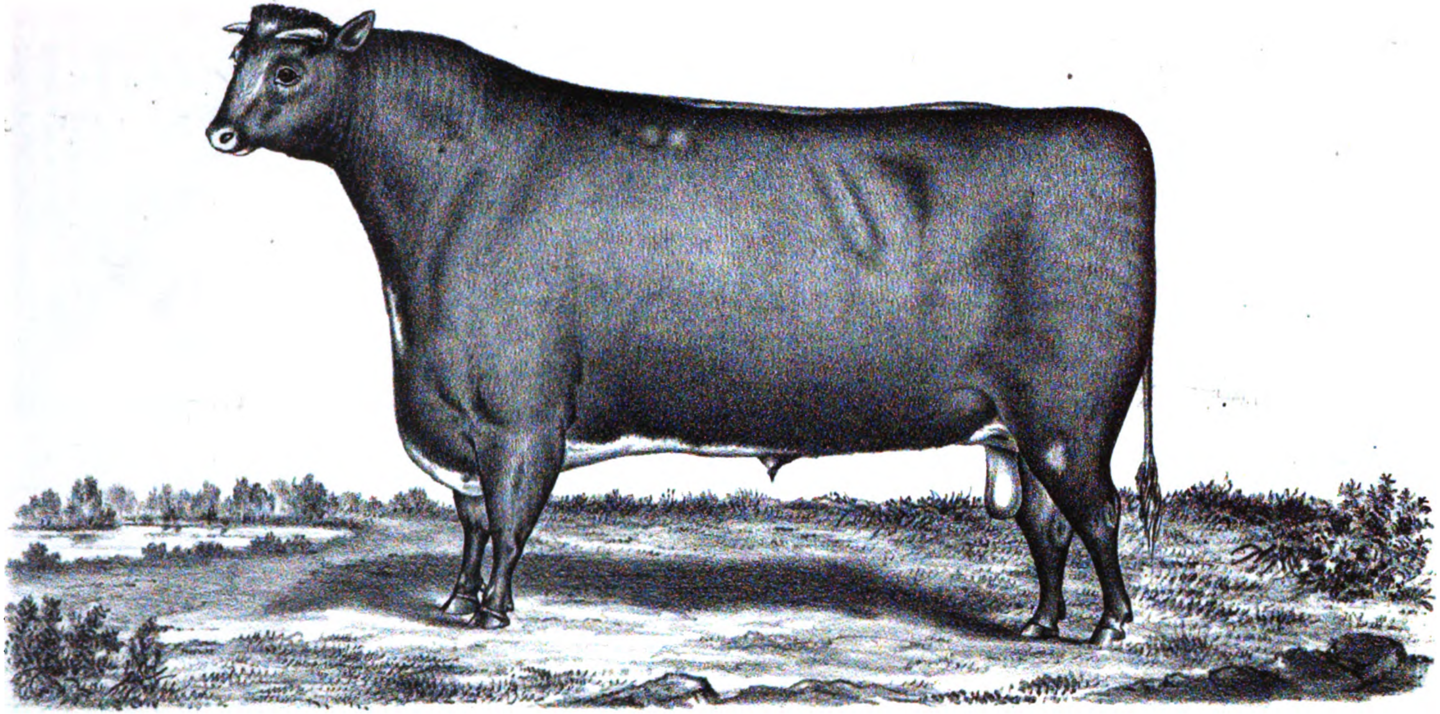
3. Fleece.—This includes the quantity, quality, and condition of the wool, as shown by the weight of fleece, the length and strength of staple, crimp, fineness, and trueness of fiber, evenness throughout, freeness from gare, and the fluidity and amount of yoke—thirteen points.

4. Form.—The shoulders should be broad and well placed, back broad, quarters long and well filled up, head short, folds on the neck, elbow, flank, belly, thighs, and tail; all the points in due proportion—nine points.

5. Size.—Rams at full growth, in breeding condition, should weigh one hundred and thirty pounds or upwards, and ewes about one hundred pounds—eight points.

6. Head.—Should be medium size, muzzle clear, nose (or face) covered with short, glossy, furry hair, eyes bright and placid, forehead broad, ears soft, thick, and set wide apart, ewes hornless, horns on the ram well turned, (set not too closely to the head and neck, nor yet standing out too widely from them,) and free from black or dark colored streaks—six points.

7. Neck.—Should be short on top and long below, strongly set to the head and shoulders, becoming deeper toward the shoulders, folds heavier underneath, and extending up the sides of the neck, including heavy dewlap and apron—five points.



Short Horn Bull

"LOUDEN DUKE of GREENWOOD"

Bred and owned by David Selsor, Greenwood Farm, Madison County, Ohio.

FIRST PRIZE PENNSYLVANIA STATE FAIR, PHILADELPHIA 1879.

8. *Legs and Feet.*—Legs short, straight, well spread apart, and bone heavy, hoofs clear in color and well shaped—four points.

9. *General appearance.*—Good carriage, bold, vigorous style, symmetrical form, and proper complexion of the covering—four points.

Total Perfection—One hundred points.

Eighty-one points required to enter in the Herd Book.

The above scale applied only to Merinos.

The exhibit was very fine of all the variety of breeds on exhibition, reflect great credit on the breeder, and were admired by the thousands of visitors who gathered around the pens. The middle and long wooled breeds were the best we have seen at any exhibition, and honestly prepared for show. Many of them were imported. There is no herd book for these breeds that we know of; however, certificates and statements of their respective strain or family were presented your committee.

SHEEP.—Sweepstakes.

S. C. Work, Buffalo, Pennsylvania, sweepstakes for best flock, consisting one ram and five lambs of his get, viz: Three ewes over two years, one between one and two years, and one ewe lamb, owned by exhibitor,	$50
T. C. Wade, Media, best fleece of one shearing from a long wooled sheep,	5

CLASS 14—Merinos.

		Scale of points.
James Glass, Burgettstown, ram over two years, first premium,	$25	85
Same. Ram over two years, second premium,	15	81
W. L. Archer, Burgettstown, ram between one and two years, first premium,	20	81¾
Same. Ram lamb, first premium,	10	81⅔
Same. Ram lamb, second premium,	8	83⅙
Same. Pen of three ewes over two years, first premium,	20	84½
James Glass, Burgettstown, pen of three ewes over two years, second premium,	15	84
William A. Herriott, Oakdale, pen of three ewes between one and two years, first premium,	20	89⅓
W. L. Archer, Burgettstown, pen of three ewes between one and two years, second premium,	15	85
Same. Pen of three ewe lambs, first premium,	15	88
James Glass, Burgettstown, pen of three ewe lambs, second premium,	10	87⅔

CLASS 15—Middle-Wooled, Including Southdowns, Oxforddowns and Shropshiredowns.

T. S. Cooper, Coopersburg, Pennsylvania, Oxford ram, over two years, first prize,	$25
Same. Second prize,	15
Samuel J. Sharpless, Philadelphia, Southdown ram, over two years, first prize,	25
Same. Second prize,	15
Same. Ram between one and two years, first prize,	20
Same. Second prize,	15
T. S. Cooper, ram lamb, first prize,	10
Thomas Shisler, second prize,	8

T. S. Cooper, pen of three ewes, over two years, first prize,	20
Samuel J. Sharpless, second prize,	15
T. S. Cooper, pen of three ewes, between one and two years, first prize,	20
Samuel J. Sharpless, second prize,	15
T. S. Cooper, pen of three ewe lambs, first prize,	15
Samuel J. Sharpless, second prize,	10

CLASS 16—Long-wooled, Including Cotswolds, Lincolns, and Liecesters.

Edward Hicks, East Goshen, Chester county, Cotswold ram over two years, first prize,	$25
Chalkley B. Zelley, Moorestown, New Jersey, second prize,	15
Thomas C. Wade, Lincoln ram between one and two years, first prize,	20
Same. Second prize,	15
Chalkley B. Zelley, Leicester ram lamb, first prize,	10
E. Hicks, Cotswold, second prize,	8
Same. Pen of three Cotswold ewes, over two years, first prize,	20
F. Y. Clopper, Greensburg, second prize,	15
E. Hicks, pen of three Cotswold ewes, between one and two years, first prize,	20
F. Y. Clopper, second prize,	15
E. Hicks, pen of three Cotswold lambs, first prize,	15
F. Y. Clopper, second prize,	10

CLASS 17.—Sheep of any Class.

Thomas C. Wade, single Lincoln sheep, first prize,	$5

SWINE.

T. S. Cooper, Coopersburg, Pennsylvania, for best herd on exhibition, (fifteen Berkshire swine,) prize,	$50

CLASS 18—Chesters.

E. B. Ashbridge, East Goshen, Pennsylvania, for boar over one year, first premium,	$20
T. Walter & Son, West Chester, Pennsylvania, second premium,	10
Same. Boar under one year, first premium,	15
Cloud & Son, Kennett Square, Pennsylvania, second premium,	10
T. S. Walter & Son, West Chester, Pennsylvania, for sow under one year, first premium,	10
Cloud & Son, Kennett Square, second premium,	5
T. Walter & Son, West Chester, Pennsylvania, for pen five sows under six months, first premium,	20
Cloud & Son, Kennett Square, Pennsylvania, for pen three sows under six months, first premium,	20
E. B. Ashbridge, East Goshen, second premium,	10
T. Walter & Son, West Chester, special premium, Gill & Pomona,	25

CLASS 19—Berkshire.

T. S. Cooper, Coopersburg, for boar over one year, first prize,	$20
Same. Second prize,	10
Same. For boar under one year, first prize,	15
T. Walter & Son, West Chester, Pennsylvania, for sow over one year, first prize,	15

T. S. Cooper, Coopersburg, second prize,	10
T. S. Cooper, Coopersburg, for sow under one year, first prize,	10
Same. Second prize,	10
Same. Pen of five sows under six months, first prize.	
Same. Pen of three sows under six months, first prize,	20
T. Walter & Son, second prize,	10
D. H. Branson, Coatesville, one boar,	20
Same. One sow,	20

CLASS 20—Essex.

J. S. Giles, Appalachian, Tioga county, New York, boar over one year, first premium,	$20
Same. Second premium,	10
Same. Boar under one year, first premium.	
Same. Second premium.	
Same. Sow over one year, first premium,	15
Same. Sow under one year, first premium,	10
Same. Second premium,	5

CLASS 21—Yorkshires.

W. H. Cole, Clinton, New Jersey, boar over one year, first premium,	$20
Same. Boar under one year, first premium,	15
Same. Sow over one year, first premium,	15
Same. Sow under one year, first premium,	10
Same. Pen of five sows over six months old, first premium,	20
Same. Pen of three sows, under six months old, first premium,	20
Same. One boar over one year,	10
Same. One sow over one year,	10
Same. One sow under one year,	5
Same. Three sows under one year,	10

CLASS 23—Jersey Reds.

James Russ, Beverly, New Jersey, one boar, over one year, second premium,	$10

GROUP V—Poultry and Pet Quadrupeds.

To the President of the Pennsylvania State Agricultural Society:

The undersigned, appointed to judge Classes 25, 26, and 27 in Group V, respectfully submit the following report:

B. F. Lewis, Gwynedd, best collection of pure bred poultry, siver medal.

In awarding this premium to Mr. Lewis, we feel constrained to say that his exhibit would have been more creditable if it had not been quite so large. There were several coops that would have looked better if they had been empty. This is notably the case with his White Dorkings, with long, yellow legs, and half Cochin tails, and with slight traces of leg feathering.

McKean & Hulick, Easton, Pennsylvania, for best trio of white Cochins, first prize,	$5
Same. Second prize,	3
J. S. Giles, Tioga county, New York, for best buff and partridge Cochins, two first prizes, each,	5
H. M. Thomas, Camden, New Jersey, for partridge Cochins, second prize,	3

E. J. Chandler, Kennett Square, Pennsylvania, for best light Brahmas, first prize,	5
J. S. Giles, for light Brahmas, second prize,	3
Same. For best dark Brahmas, first prize,	5
H. M. Thomas, for dark Brahmas, second prize,	3
Special premium recommended for three fine light Brahma hens, exhibited by McKean & Hulick,	3
B. F. Lewis, for best trio of silver gray Dorkings, first prize,	5
J. H. Diehl, Beverly New Jersey, for best trio of Jersey Blues, first prize,	5
B. F. Lewis, for best trio of black Spanish, first prize,	3
John Bradley, of Philadelphia, subsequently brought in a pair superior to the above, but not being a trio they could not compete.	
Cloud & Son, Kennett Square, Pennsylvania, for best trio of white Leghorns, first premium,	5
Alonzo Neats, Philadelphia, for best trio of white Leghorns, second prize,	3
J. Satterthwaite, Jenkintown, Pennsylvania, for best brown Leghorns, first prize,	5
Germon & Thursman, Philadelphia, for best brown Leghorns, second prize,	3
C. C. Butler, Beverly, New Jersey, for trio of Dominiques, second prizes, each,	5
C. L. Lukens, Philadelphia, for trio of Plymouth Rocks, first prize,	5
J, E. Combs, Philadelphia, for trio of Plymouth Rocks, second prize,	3
S. T. Yerkes, Philadelphia, for American Dominiques, first prize,	5
E. J. Chandler, for Amerian Dominiques, second prize,	3
J. Satterthwaite, for Golden Poland, first prize,	5
Wilson Bernard, Chester county, Pennsylvania, for golden Poland, second prize,	3
E. J. Chandler, for W. C. black Polands, second prize,	3
J. E. Dehl, S. G. Dixon, and H. M. Hewitt, for Malays, Earl Derby games, and B. B. red games, first prizes, each,	5
Shuber Brothers, for B. B. red games, second prize,	3
B. F. Lewis, for blue red games, second prize,	3
C. Sadler, Philadelphia, for silver spangled Hamburgs, first prize,	5
Same. For silver spangled Hamburgs, second prize,	3
J. E. Coombs, for black Hamburgs, first prize,	5
J. and G. Dixon, for black Hamburgs, second prize,	3
J. A. Stovell, Philadelphia, for golden penciled Hamburgs, first prize,	5
Same. For golden penciled Hamburgs, second prize,	3
E. B. Twaddell, Philadelphia, for golden spangled Hamburgs, second prize,	3
J. E. Diehl, for golden sea-bright Bantams, first prize,	5
J. C. Maple, for golden seabright bantams, second prize,	3
Same. For silver sea-bright Bantams, first prize,	5
E. M. Tolman, Philadelphia, for B. B. red game Bantams, first prize,	5
G. Snyder, Easton, Pennsylvania, for B. B. red game Bantams, second prize,	3
G. Snyder, for black game Bantams, first prize,	5
Same. For black game Bantams, second prize,	3
Same. For red pile game Bantams, first prize,	5
Bennett & Colby, Phillipsburgh, New Jersey, for silver ducking Bantams, first prize,	5
McKeene & Hulick, for black Bantams, first prize,	5

Same. For black Bantams, second prize,	3
Same. For white Bantams, first prize,	5
B. F. Lewis, for white Bantams, second prize,	3
J. J. Wilson, Philadelphia, for booted Bantams, first prize,	5

The show of black breasted red Bantams was creditable throughout, and the competition close. The other exhibitors in this line were A. A. Thumlett, E. M. Tolman, C. Lukens, Philadelphia; Thomas Tiplady, Darby; Bernard Marke, Conshohocken; H. H. Hewit, Blair county; and Bennett Colby, Phillipsburgh, New Jersey.

J. E. Diehl exhibited a beautiful pair of Curassows, (genus Crax,) and an Egyptian goose, for which we recommend a special premium of	$5
B. F. Lewis, for bronze and white turkeys, first prize, each,	5
Same. For white and pearl guineas, each,	3
J. W. Rooke, Philadelphia, for silver and golden pheasants, first prizes, each,	3
J. E. Diehl, for Egyptian goose, first prize,	5
B. F. Louis, for Toulouse geese, first prize,	5
H. M. Thomas, for Toulouse geese, second prize,	3
B. F. Lewis, for Bremen geese, first prize,	5
Same. For Bremen geese, second prize,	3
J. S. Giles, for Pekin ducks, first prize,	5
B. F. Lewis, for Pekin ducks, second prize,	3
Wilson Bernard, for Rouen ducks, first prizes, each,	5
B. F. Lewis, for Aylesbury and white crested ducks, first prizes, each,	5
Cloud & Son, for Musk ducks, first prize,	5

Some of the largest Pekin ducks were disqualified because their bills were improperly presented, being marked with black spots and streaks.

Mr. Stephen Taylor, of Bucks county, showed four coops of well proportioned fowls, which he has christened "White Dominiques." As in chicken literature dominique is a color as well recognized as white or black, we infer Mr. Taylor must be of Irish descent. The Hibernicism in this case is too good to be lost, consequently we record it.

We would recommend Mr. Taylor to call his birds "Albinos of dominique parentage."

With due allowance for the time of year which is the worst possible for adult fowls, and not very good for young ones, we consider the exhibition in this line very creditable.

J. E. Diehl, for pigmy pouters, first prize,	$3
Benton Maloney, Norristown, Pennsylvania, for carriers, first prize,	3
Same. For carriers, second prize,	2
Norman T. Leslie, for white fan-tailed pigeons, first prize,	3
T. J. Quinton, Philadelphia, for white fan-tailed pigeons, second prize,	2
John Parker, Philadelphia, for black fans, first prize,	3
G. Johnson, Philadelphia, for almond tumblers, first prize,	3
B. F. Lewis, for black tumblers, first prize,	3
John Parker, for yellow bald and red bald pigeons, first prize, each,	3
D. W. Gross, Philadelphia, for white owls, first prize,	3
A. W. Gross, Philadelphia, for white owls, second prize,	2
G. Johnson, for blue owls, first prize,	3
D. W. Gross, for blue owls, second prize,	2
John Parker, for black owls, first prize,	3
C. A. Gross, for silver owls, first prize,	3
Same. For black tailed turbits, first prize,	3
John Parker, for yellow turbits, first prize,	3

C. A. Gross, for yellow turbits, second prize,	2
John Parker, for black priests, first prize,	3
Same. For Mahomets, first prize,	3
Same. For silver Antwerps, first prize,	3
Same. For red chequered Antwerps, first prize,	3
Same. For blue Antwerps, first prize,	3
Same. For yellow and red barbs, first prize,	3
B. F. Lewis, for Himalayan and doe rabbits, first prize, each,	3
J. Satterthwaite, for buck and doe rabbits, second prize, each,	2
B. F. Lewis, for best pair English rabbits, first prize,	3

By request, we have acted upon incubators, two of which are entered by F. Meyer and H. B. Tatham, both of Philadelphia—the latter of which was not in operation when examined. It is reputed to have done good work. We consider Meyer's the best incubator we have ever seen, here or elsewhere, and Mr. Roper, of our committee, has seen the most of them. We cheerfully award it the silver medal.

Albert Davis, of Philadelphia, has on exhibition an admirable folding coop, for which we recommend a diploma.

For the satisfaction of constitutional grumblers, we will state that all of our awards have been made without a difference of opinion.

(Signed) DAVID TAGGART, *Chairman.*
W. T. ROGERS.

NOTE.—By reference to our report you will see that Mr. Dixon was awarded second premium for Black Hamburgs. The mistake was made in the office.

I have corrected an ommission made by myself in Buff Cochins, and awarded second premium on Silver Seabrights. Mr. Maple's pair, the male especially, are too large.

DAVID TAGGART, *Chairman.*

Incubators.

Mr. Tatham hatched chickens in the early part of the week, but the gas was turned off, thereby destroying the life of the chicks in the eggs.

SECRETARY STATE AGRICULTURAL SOCIETY.

To President William S. Bissell:

SIR: Your committee, L, of awards department, Group VI, Class 28, and Nos. 589, 590, and 1,294, of the twenty-sixth annual exhibition of the Pennsylvania State Agricultural Society, beg leave to report, that they find the exhibits, bee-hives, honey-bees, and their products, much smaller than the importance of this branch of industry would seem to warrant. The crowds of interested spectators always to be found gathered around the busy little workers, testify the growing attention of the public mind to the subject.

Honey-Bees at Work.

T. F. Wiltman, 318 North Sixth street, Camden, New Jersey, exhibits pure Italian bees at work in hives of his own construction. Their bright yellow coats are very beautiful, and the superior industry attributed to this race above our native bees is seen in their steady accumulation of honey during the exhibition.

Best Arranged Bee-Hive.

The hives in which these Italian bees are at work are of Mr. T. F. Wiltman's own construction, and they combine, in the judgment of your committee, all the essentials demanded by advanced bee-culture. They are portable, and simple in shape, giving entire control of the interior of the hive by means of movable frames, with their ends guarded by metallic coverings, and they have, moreover, directly over the bees, without the intervention of what has been known as " the honey board," two courses of small one pound boxes, twenty-eight boxes in each course, or fifty-six in all, thus giving the honey in the best possible marketable shape. We cordially recommend this exhibit, both the bees and the hives, as of exceptional merit in all respects, and deserving of the highest prizes awarded. Silver medal.

Best ten pounds of Honey in Comb.

The same party also displays ten pounds of honey in comb, of excellent quality, in the little boxes already described. It is not quite so white as a ten pound jar of honey deposited by John G. Calvert, Newtown, Delaware county, Pennsylvania. If convenience for marketing must be taken into consideration, Mr. Wiltman's must take the first prize. If color alone is of more value, then Mr. Calvert must take it. In the opinion of your committee, the weight and quality of the honey being equal, the arrangement that guards against commercial waste should be considered above color, and should give the highest distinction to Mr. Wiltman for honey in comb. Premium, $5

Mr. J. G. Calvert, Newtown, Delaware county, Pennsylvania, shows the best five pounds extracted honey in glass jars ; very fine and light colored.

Respectfully submitted,

M. LOUISE THOMAS,
Tacony, Philadelphia.

Mr. Wiltman also shows a *Centrifugal Extractor* for removing honey without destroying the comb. It is light, portable, and cheap, and deserves honorable mention.

WILLIAM S. BISSELL, Esquire,
President State Agricultural Society:

SIR: The undersigned have examined the exhibit of the Permanent Exhibition Company of silk worms, raw silk, and their processes of raising the worms and reeling the silk. Great credit is due to the company, and the manager of the department, Dr. Samuel Chamberlain, for the zeal and energy manifested in this work. It has fully demonstrated that silk culture can be established, and successfully carried out. There is no reason why any farm in this country (in such climates of course as are suitable for the existence of the worms) should not be planted with sufficient mulberry trees to enable every farmer's wife and daughter to start a cocoonery, and produce good marketable silk. Nearly every portion of our country is suitable for the purpose. With a little assistance, and encouragement, which it well merits from our citizens, the company will be able to continue the work, and thus in time show that we are able to successfully produce that which has hitherto been almost an unknown product of our great and enterprising country.

We are fully of the opinion that this exhibit is worthy of, and recommend the prize for Group VI, Class 29, No. 310.

Silk worms,	$25
Best pound reeled silk,	5
Best bushel of cocoons,	5

We also recommend the exhibit of Belding Bros. & Co. sewing silk, being the only exhibit of that article in competition for the prize offered in Group II, No. 429, for the best pound sewing silk, . .	$5

(Signed) HORACE J. SMITH, *Chairman.*
WM. B. HACKENBURG.

GROUP IX—THE DAIRY.

WILLIAM S. BIDDLE, Esquire, *President:*

DEAR SIR: We, the undersigned, committee appointed to examine the butter and cheese, find the exhibit of print butter very limited, but very fine, and generally of excellent quality. The exhibit of tub butter was not what it should have been. There is a very full line of cheese displayed from different parts of our State, which compare favorably with the best New York State cheese.

The Higgins medals, awarded as special premiums, were offered by H. K. and B. F. Thurber, New York, for cheese and butter salted with Higgins' salt.

E. Satterthwaite, Jenkintown, Montgomery county, Pennsylvania, ten pounds print butter, first premium, ...	$15
G. F. Curven, Villanova P. O., Pennsylvania, ten pounds print butter, second premium, ...	10
Quakertown Creamery, tub of butter, forty pounds, first premium, .	20
D. A. Breese, Montrose, Susquehanna county, second best tub of butter, salted with Higgins' salt, ...	$15 or diploma.
Same. Second premium, ...	Higgins silver medal.
Doctor Sherrerd, Venango, cheese, first prize, ...	30
D. H. Wright, Saegerstown, cheese of 1879, first gold medal, Thurber prize.	
J. L. Wykoff, New Richmond, cheese of 1879, first prize, . . .	20
John Cole, Venango, cheese of 1879, second prize, ...	20
W. Nash, Crossingville, cheese of 1879, third prize, Thurber bronze medal.	
H. McGuire, Conneautville, cheese of 1879 second prize, ...	20
W. Porter, Chapinville, cheese of 1879, third prize, ...	10
Ira R. Hall, Randolph, cheese of 1879; second Thurber prize, silver medal.	

J. R. EBY, *Chairman,*
R. K. NEFF,
W. F. DRENNAN,
G. SCHWARZ.

PHILADELPHIA, *September 16, 1879.*

To the President and Members of the State Agricultural Society:

GENTLEMEN: Your judges on the trial of churns, held in the machinery department of your exhibition to-day, respectfully report that the conditions of the trial were that each contestant should be permitted to select the size of the churn and the quantity of cream, time, quality of yield, and its proportion to quantity of cream employed, being the conditions to secure the award. Six competitors entered the contest, viz:

Brown & Speakman, churn, "Pride of the East."
S. W. Green & Co., Philadelphia.
Doctor C. J. Cram, Haddonfield.
Clement & Dunbar, Philadelphia.
E. Craft & Co., Philadelphia.
J. B. Marquis, Blanchard power churn, Jenkintown.

The churning, except in the case of the last named, was performed by the several representatives of the churns in contest. All were in readiness by three o'clock in the afternoon, and at that hour the signal was given to start, and all entered the contest at the same time, which resulted as follows:

Competitors.	*Cream.*	*Time.*	*Butter.*
Brown & Speakman, ...	7 qts.	5 min.	2 lbs. 05 oz.
S. W. Green & Co., ...	14 qts.	14 min.	4 lbs. 02 oz.
C. J. Cram, ...	6 qts.	15 min.	1 lb. 14 oz.
Clement & Dunbar, ...	10 qts.	17 min.	2 lbs. 14 oz.
E. Craft & Co., ...	8 qts.	15 min.	3 lbs. 07 oz.

Power churn "Blanchard," entered in the contest by J. B. Marquis; quantity of cream, 125 quarts; time, 19½ minutes; amount, 62½ pounds.

The award is: First premium to "Pride of the East," by Brown & Speakman, ... Silver medal.

The greatest interest in the trial was manifested by the thousands of spectators who witnessed it, and general satisfaction was expressed at the fairness and impartiality with which all the arrangements were conducted.

All of which are respectfully submitted.

David H. Branson *Chairman*,
William H. Holstein, Bridgeport,
Jared Darlington, West Chester,
Mrs. Hettie Hallowell, Norristown,
Mrs. J. C. Morris, Friendsville, Pennsylvania,
Mrs. Rebecca McInnis, Bridgeport, Pennsylvania,
Mrs. Alice H. Holstein, Bridgeport, Pennsylvania,
Committee.

The committee would recommend a silver medal to Brown & Speakman, as the churning was not only done in quicker time, but the butter was decidedly of a superior quality, as expressed by all the committee.

GROUP XII—FEATHERS, HORN, HIDES, LEATHERS, &c.

S. D. Sollers & Co., Philadelphia, misses' and children's shoes, silver medal.

John A. Sambaugh & Co., Philadelphia, collection of fancy furs, bronze medal.

A. Scharff, Philadelphia, whips, &c., bronze medal.

Leas & McNelty, Philadelphia, oak sole leather, silver medal.

Samuel R. Phillips, Philadelphia, harness, silver medal.

A Lynch, Philadelphia, collection of harness, second premium.

Honorable mention made of S. L. Denney, Gap, Lancaster county, Pennsylvania, automatic hame fastening. B. B. Oil Blacking Company, oil blacking, and E. N. Banks, Wilkes-Barre, Pennsylvania, improvement in trace fasteners.

By Executive Committee.

Patrick McFadden, Philadelphia, for harness, a bronze medal.

Joseph Weidel, of Philadelphia, for double set of express harness, diploma.

The committee regret that the exhibit in this group was not of that size and excellence they expected from a State and city so prominent for leather and its manufacture.

S. A. Hummel,
G. N. Hoffstott,
J. F. Eppleheimer,
Committee.

Supplementary report on the exhibit of the American Vegetable Fiber Company, (limited,) Joseph F. Duntar, manager, 213 South Front street, Philadelphia; the Automatic Breaking and Scutching machine, N. de Landtsheer, patentee.

Your committee respectfully report, that they have carefully examined this machine in operation, and find that by this invention flax, hemp, and similar plants can be broken and scutched much more cheaply than by hand, although they regret to find that the machine is high in price.

They recommend that it be awarded a bronze medal, for simplicity and utility for the purpose designed.

JOHN McDOWELL, *Chairman.*

September 17, 1879.

Supplementary report on the exhibit of E. LeFranc, American Ramie (China grass) plants and fibers, and American jute (Abutillon) fibers.

Your committee respectfully report, that they have examined the plants, fibers, and articles manufactured from them, but that there was no one at the exhibit to explain the process by which the fibers were prepared for use; the materials, however, seemed very well adapted for many purposes, and we submit the following extracts from an article by Mr. LeFranc, on his exhibit:

AMERICAN TEXTILES.

Emerson said that thousands of valuable plants are still ignored and ill-treated in America.

A good share of this truism is applicable to fibrous plants.

With its varieties of climates and soils, the vast territory of the United States produces, or can produce, all the textile materials required by the immense consumption of its inhabitants. Still, over fifty millions' worth of raw fibers are imported yearly, and draw that much from the legitimate wealth of the country. There is in that industrial sphere a lack of progress quite abnormal with the wonderful development so markedly accomplished the past few years in almost every other branch of American production.

What are the main causes of this gap in our progressive roads? Why are we yet tributaries instead of being suppliers, or at least independent, in the long textile line?

The reasons are somewhat intricate outside of the agricultural non-protection of the tariff, which is rather partial to manufacture. But there are three reasons well defined. They are: In the rural inertness regarding unroutined cultivation; in the want of sufficient teaching to handle new products, and in the indifferences of the government, a great consumer, practicing a suberb ignorance of the interest of the feeding producer. Too much of personal politics, and too little of political economy.

The most prosperous nations are those where a protective government promotes, by official coöperation, the new sources of wealth of which the country is susceptible.

If France, for example, produces sugar, silk, and wine to such an extent as to be able to live richly out of these three products alone, it is due to the official lever which, through education and bounties, opens the fountain of national wealth.

Individual efforts cannot frequently command adequate power to bring forth new agricultural products into commercial use. It requires quantities of supply and outlays of contrivances that only substantial combinations can reach. Private capital is generally too timid to embrace these practical exigencies before demonstrated tests of a costly nature. Hence a certain dead-lock in that line of undeveloped progress.

In Europe, such case being brought to public attention, a commission is generally appointed by the government to examine the merits of the novelty, and if found of some importance, an encouraging bounty is offered to the producers. This material and moral support works wonders, and never fails to bring out promptly whatever is beneficial in the object. In that simple system lies the secret of the industrial superiority and prosperity of the French.

The State of New Jersey has lately attempted the adoption of that reliable and economical method to develop her natural resources in textilous plants.

After the Centennial, Governor Bedle appointed a commission to study the practicability of diffusing the production of textiles in the State.

Messrs. Samuel C. Brown, Professor Purman, and the regretted G. N. Dale, of Patterson, were members of this commission.

Having collected all the necessary information on the possibility of establishing the textile cultivation in the uncultivated land of the State, they closed their investigation in proposing the encouragement of a bounty to producers.

A bill to that effect was presented to the Legislature under the title of "A bill to stimulate the growth of fibrous plants."

It offered the following inducements:

Twenty-five cents per hundred pounds of American or Indian jute stalks.
One and a half cents per pound for the fiber disintegrated from the same.
Two and a half cents per pound for the best quality of said fiber.
Fifty cents per hundred pounds of ramie stalks.
Five cents per pound for the crude fiber from said stalks.
Ten cents per pound for the fine staple made from the same.
Thirty-five cents per hundred of flax straw.
Three cents per pound for the disintegrated fiber from the said straw.
Twenty-five cents per hundred pounds of hemp stalks.
Two cents per pound for cleaned hemp from the same.

The sum of $10,000 was limited during two years to promote this industry. Meanwhile, a technical school was projected to teach the skill, manipulations, and fabrics of the products.

No doubt the ball, being thus put in motion by that bounty stimulant, would have kept up rolling, and the industry would have been established at a small cost, turning to be an investment of large income. The direct and indirect revenue to the State from the new source of trade would soon have repaid the public treasury.

Though favorably commented upon by the press, the bill failed to pass, for good or bad reasons. The few politicians adverse to it objected that a republican government cannot foster by bounty private enterprise like monarchical Europe, &c. It is hard to conceive what the form of government has to with the industrial development of the country. The best and only good government is that whose officials know best how to create public wealth and prevent public poverty in a country naturally rich like this.

The fallacy of the objection is visible and palpable, even under this government.

What is the protective tariff, if not an indirect bounty to private manufacture?

What is the grant of lands to railroads, canals, &c., if not a direct bounty to private enterprise?

In that light, there is nothing else but private enterprise; even the government, made of private interests collected into an expansive body of individuals, so-called, the servants of the people.

If the science of political economy was more familiar to our rulers, the nation would soon cease to be tributary to foreign lands for textiles, sugar, and wines. These three valuable products are in the bosom of the American soil.

Knowledge and spirit of national duty are the only implements we want to dig them up.

In New Jersey and Pennsylvania alone, ten varieties of indigenous fibrous plants are fighting for existence against the barbarous treatment of farmers, destroying them as vile weeds!

The fine tribe of the Malvaceas, of the Asclepias, of the Agaves, &c., as well as the Liliacea order, are represented by members most willing to be fostered and brought into utilization. One of them, the Indian mallow—Abutilon avicennæ—is the most prolific and tenacious of all. It grows wild wherever it gets a chance, and in some moist loams it reaches over eight feet in height.

It yields a strong and clear fiber, equal to the best imported hemp. It has been mis-named American jute. Being of a far superior value to Indian jute, no parentage should be established between the two materials. They are not from the same family.

The existence of this plant as a new material is assuredly an advantage. But it must be completed by a proper and economical method of disintegration. None of the ordinary process applied on hemp, flax, &c., can work this peculiar plant no more than ramie, so much maltreated by the old mode of treatment.

Abutilon is a solid and tenacious stalk, presenting no brittleness like the above textiles. Brakes, rollers, scrapers, will not begin to move its elastic and thick, ligneous body. Its dissociation from the fiber must be done by an entirely new process. This has been discovered and successfully tested, as it can be seen by the fine exhibit called American jute, in the Textile Department.

Ramie and the other fibrous plants will be objects of our next article on American textiles.

They recommend that the exhibit receive honorable mention.

JOHN McDOWELL.

September 17, 1879.

Mr. E. Le Franc shows specimens of the American jute and ramie, which he has successfully prepared for manufacture.

AMERICAN TEXTILES—NO. 2.

The Abutilon.

The Abutilon (mallow plant) seems to be a natural product of the American soil. It thrives almost all over the States of temperate latitudes, and it is surprising that while so much pains was taken to introduce foreign plants in American cultivation, this excellent indigenous growth was ignored or persecuted.

As heretofore said, it yields a fiber which is liable to various applications. It combines the tensility of hemp and bright color of sisal with the length and suppleness of Indian jute, by certain chemical treatment. Its divisibility is such that the filaments can be reduced to the softness of wool.

For bleaching and coloring, it is far superior to Indian jute, which, belonging to the astringent tribe of the Liliacea, (linden,) is naturally refractory to fast and bright dyeings. While it has all the brilliancy of the Inpian variety, the American Abutilon offers no resistance to any shades. As the exhibit proves it, the fiber takes the cheap analine colors readily. This important advantage opens wide ranges of industrial applications to the product. From rope and twine it will reach the richer spheres of matting and carpet. Was such a plant, abundant as it is here, in Europe, it would in no time be transformed into the finest sorts of goods, and imported at a high cost by our people.

Farmers will do well to gather all the stalk and seed they can this season to plant all they can next spring. It cannot fail to have a commercial value as soon as there is enough produced to justify factory works. There can be no easier nor better opportunity to draw a good income from uncultivated or unprofitable lands. If the eastern farmers neglect this opportunity, they will be soon outwitted by the West, where a strong movement is now made in favor of the immediate development of the new product.

Regarding its production, no farmer shall have trouble; the seed, which, by the way, contains a good sweet oil, will grow in any soil having a fair average of humus and moisture. Loamy meadow, strong clayish soil, or stable-manured sandy soil, will produce it fast enough to yield two crops a year. Planted like wheat, early in spring, the first crop will be ready in July, and the second in October, at an avearge length of five feet. Then the yield per acre can not be much less than eight tons per acre, four tons each crop.

The value of the stalk can not be lower than eight dollars per ton for central factories as projected.

The great difficulty in developing the textile productions was heretofore in the necessity of the farmer to be grower and manipulator at the same time. The task is too heavy for one; it must be divided between small producers and central manufacturers buying the raw crop.

The disintegration of the plant can not be done by the ordinary process of rotting and heckling like for hemp and flax. The stout and tenacious nature of the woody part allows no system of that sort. It must be treated by chemical and instrumental processes constituting quite a new departure in the industry. Complete studies and experiments have been made on the subject, and new apparatus have been established for the proper treatment of the plant. The exhibit referred to is the result of the novelty.

Ramie, or China Grass.

The beautiful silky fiber, of various shades, which attract so much attention, besides the Abutilon staple, at the fair, is a vegetable silk produced by the ramie plant, growing luxuriantly in New Iersey.

This plant, of the nettle family, (*Urticea,*) is a perennial of great value, once started. It yields three crops a year, of four and a half feet each, without replanting, and it keeps propagating all the time at a rapid speed. Erroneously called a tropical plant, it was never considered susceptible of prosperity in this latitude. But some one, knowing better, tried it in Jersey, after the Centennial, with a surprising success. The only precaution is to cover the stand in winter with a good coating of non-conductor material—leaves, straw, salt hay, and stable manure. As this saves the labor of replanting, and as, anyhow, the soil would have to be manured, there is ample compensation. It is, moreover, worth the while, since the yield per acre is equivalent to one ton of clean fiber far more valuable than cotton. Its gross yield in stalks is six tons, at ten dollars.

Here again, farmers could not undertake that cultivation if they had to manipulate the product. The disintegration of ramie was a great problem, which has lately been radically solved in this city. A factory is now ready to pay ten dollars per ton for the dry stalks, which go under new process like the Abutilon. The Department of Agriculture at Washington has distributed some seed, and may distribute some more yet, to farmers. But we must warn them that this seed is not so easy to deal with as the Abutilon. Fine and dusty, like snuff, it must be sown in boxes, kept in warm, shady places, and nursed up with great care. When two or three inches high it must be transplanted, like cabbage, in finely pulverized and rich soil.

If the sun is too ardent, the young plants must be covered during the day and uncovered at night. All this labor could be avoided if roots could be had, but unless imported from China or India, there is no other way to start than by the seed-nursery system.

Once started, there is no crop in the world equal to ramie. Twenty-five acres of it will make a sure and comfortable income for a family.

If it has not taken its development in Louisiana, where it was attempted, it was because the soil, being too low, the roots decayed, and finally perished. Besides that mortal drawback, the disintegration problem was not satisfactorily solved, as it is now, and no market was ever open for the stalk, as it is now here. One thousand tons of it could be sold readily at the above named price of ten dollars.

This system of separating the growing and the manufacturing into different hands is the only practical mode of diffusing the productions. There is no doubt for each to dispose of their respective products, and no difficulty in mastering the requirements of the business, since each one knows them well. The ramie exhibit speaks for itself. The ramie disintegration has been, and is yet, a vexed question in Europe. Manufacturers there depend upon the scanty supply of the Asiatic hand labor separating the filament from the bark. The plant is of such peculiar nature that no mechanical process known could treat it properly. In fact, no single machinery can possibly extract it with the economy and quality required. The problem was solved by a combination of agencies, acquired after intense studies, which very few men can command, and which no farmer could apply, even with the apparatus on hand. Therefore, the best plan for them is to produce and sell the plant in its natural state.

GROUP XIII—OILS, FATS, AND SOAPS.

Malcomb Stevenson, flavoring extracts,	Diploma.
Eastman Bros., best toilet soaps,	Silver medal.
J. Hamilton & Son, second best toilet soaps and perfumery,	Bronze medal.
E. S. Morris & Co., palm oil,	Silver medal.
H. S. Ziegler & Co., stove polish,	Honorable mention.
James Dixon, New Jersey, axle grease,	Bronze medal.
G. T. Lewis, Soda and potassa,	Honorable mention.
Murziers & Co., soda and potassa,	Honorable mention.
G. C. Napheys, lard oil,	Bronze medal.
Bean & Bro., perfumery and fancy soaps,	Honorable mention.
J. F. Pettit & Co., perfumery,	Honorable mention.
John Lucas & Co., Philadelphia, paints,	Bronze medal.
French, Richards & Co., Philadelphia, paints,	Diploma.
Harrison & Co., Philadelphia, paints,	Diploma.
Eastman Bros., Philadelphia, Perfumery,	Silver medal.

PENNSYLVANIA SOCIETY AGRICULTURE,
STATE FAIR, PHILADELPHIA, *September 15, 1879.*

Mr. President, &c.:

GENTLEMEN: Your committee on Group XIII, of the exhibition of the State Agricultural Society for 1879, do hereby recommend that a *diploma* be awarded Malcolm & Stevenson, for the best flavoring extracts. A *silver medal* to Eastman Brothers, for best toilet soaps and perfumery. A *bronze medal* to J. Hambleton & Son, for second best perfumery. A *silver medal* to E. S. Morris & Co., for a new article of commerce in the form of a pure white solid fat expressed from the kernels of the palm nut, and also for their palm oil, prepared in Africa, and hermetically sealed at the moment of preparation for transportation to market, thus supplying a pure oil, free from rancidity; also, for pure palm soap made from the latter, and likewise free from rancidity (——,) which affects all other palm oils. A bronze medal for lard, by G. C. Napheys & Sons. Your committeee would direct attention to, and commend the extensive display of stove polish, etc., of the well known firm of H. S. Zeigler & Co. Of axle grease, thought to be a novel compound of black lead and oil, by Joseph Dixon Crucible Company of New York, award of bronze medal. Of caustic soda, by G. T. Lewis and Menzies' Company; of perfumery and fancy soaps, by Bean & Brother, and of perfumery by J. F. Petit & Co. The excellent collection of flavoring extracts by A. & A. Jones, overlooked by improper classification, deserves special mention for quality and display.

Very respectfully,
W. H. G. ADNEY, *Chairman,*
HUGH HAMILTON,
JAMES C. BOOTH,
Committee.

September 18, 1879.

In order to recencile some differences due to an unfortunate confusion, arising from imperfect arrangement and classification, the Executive Committee have conferred upon the undersigned full power to make some additional awards to exhibitors of paints. After consultation with Professor Booth, I would award to John Lucas'& Co., for much the fullest exhibit of paints, &c., a bronze medal. To French, Richards & Co., and to Harrison, Brother & Co., each a diploma.

W. H. G. ADNEY, *Chairman.*

By similar reference, a bronze medal is awarded to the Joseph Dixon Crucible Company, for what appears to be a very superior article of axle grease.

A special award of a bronze medal was made by the Executive Committee to Jean A. Mathien, for very superior display of the products of distillation of wood.

W. H. G. ADNEY,
Chairman on Groups XLI and XIII.

GROUP XIV—CURED ANIMAL FOOD.

Atmore & Son, No. 141 South Front street, Philadelphia, exhibit of mince meat, ... Bronze medal.

(Signed) EDWARD C. CHEESEBROUGH,
ISRAEL MICHENER,
Committee.

GROUP XV—GRAIN AND SEEDS.

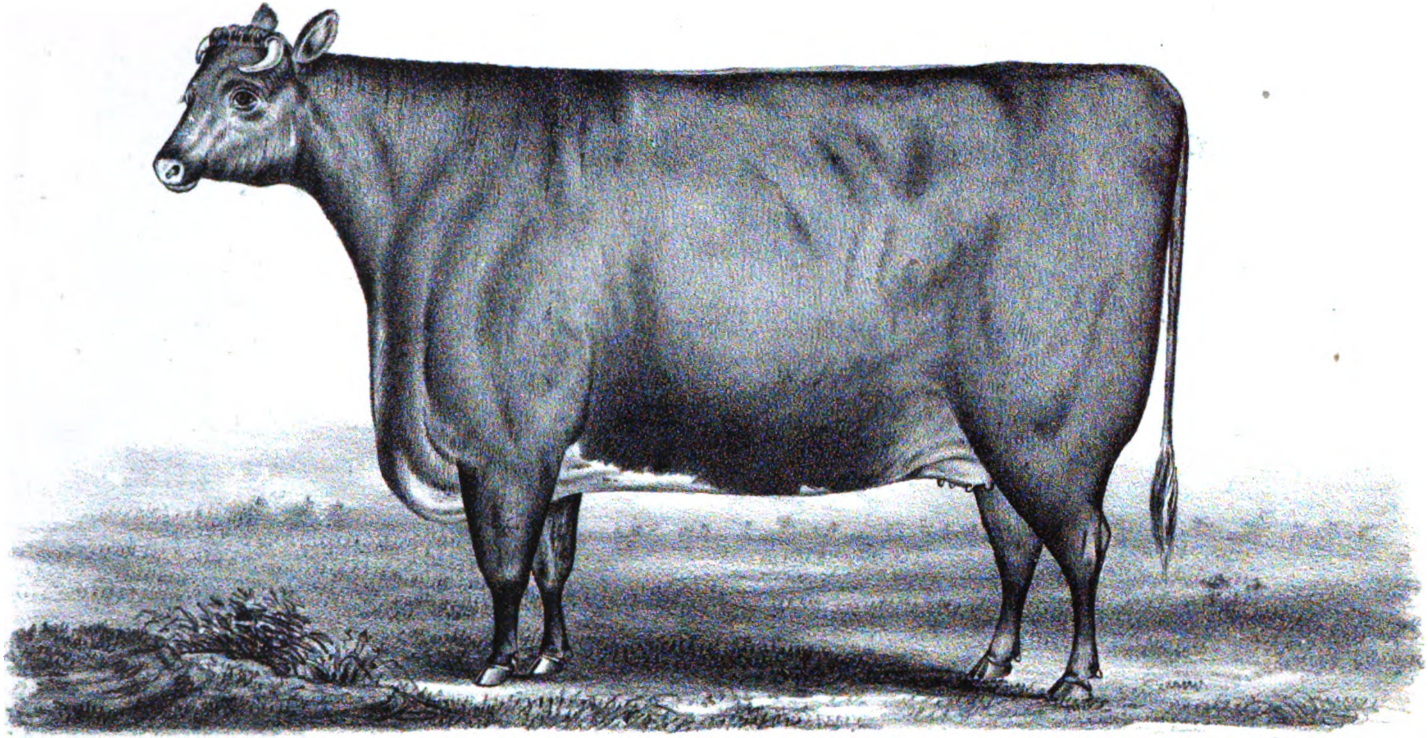
J. F. Tillinghast, Factoryville Farmers' Club, Wyoming county, best half peck mangold seed,	$3
Same. Best half peck sugar beet seed,	3
Same. Best half peck carrot seed,	3
Same. Best half peck parsnip seed,	3
Same. Best half peck onion seed,	3
Same. Best bushel buckwheat seed,	3
Same. Half bushel cucumber seed,	3
E. B. Ashbridge, Willistown Inn, Chester county, best bushel barley,	3
W. H. Jones, No. 1621 Market street, Philadelphia, seed in boxes and barrels,	5
Solebury Farmers' Club, Bucks county, best six bushels white wheat,	15
Same. Best six bushels red wheat,	15
Same. Best six bushels yellow corn, on ear,	10
Same. Best six bushels oats,	8
Same. Best six pecks timothy seed,	12
Same. Best six pecks clover seed,	12
Same. Best six bushels rye,	12
Same. Best bushel red wheat,	6
C. B. Rogers, 133 Market street, Philadelphia, best bushel rye,	5
Same. Best half bushel field beans,	3
Same. Best half peck ruta baga seed,	3
Same. Best half peck sorghum seed,	3
Same. Best half peck flaxseed,	3
Same. Best bushel clover seed,	5
Same. Best pound tobacco seed,	3
J. D. Kirkpatrick, best peck newly introduced corn,	5
Cumberland County Horticultural and Agricultural Society, best collection of wheat,	40
Same. Best collection of rye,	25
Same. Best collection of oats,	20
Same. Best collection of barley,	20
Same. Best collection of corn,	20
Same. B. F. Hertzler, Cumberland County Horticultural and Agricultural Society, collection wheat,	15
Samuel Wilson, Mechanicsville, Bucks county, best bushel white Clawson wheat,	5

(Signed) ABNER RUTHERFORD, *Chairman.*
D. Y. WILSON,
A. F. PRENTZEL.

GROUP XVI—FLOUR, MEAL, AND THEIR PRODUCTS.

G. V. Hecker, & Co., No. 201 North Broad street, best barrel wheat flour,	Silver medal.
Lambert Thomas, second best barrel wheat flour,	Bronze medal.
G. V. Hecker & Co., best half barrel farina flour, self-raising wheat flour, griddle cakes, and buckwheat flour,	Diploma.
Atmore & Son, Philadelphia, English plum pudding,	Diploma.
S. F. Prentzel, 1128 Market street, crushed oats,	Diploma.

J. B. LAWSON,
D. C. GUNCKEL,
J. S IVINS,
Committee.



Short Horn Cow

"PROFITABLE 9th"

Bred and owned by David Selsor, Greenwood Farm, Madison County, Ohio.

FIRST PRIZE PENNSYLVANIA STATE FAIR, PHILADELPHIA 1879.

GROUP XVIII—SUGARS AND CONFECTIONS.

Your committee (ex-tempore) to judge taffy and mosey sugars award:

Croft, Wilbur & Co.,	Silver medal.
Frank Buck,	Bronze medal.

Both are residents of Philadelphia. To the latter we also recommend a diploma for his enterprise in manufacturing choice and cheap candies on the grounds.

DAVID TAGGART, *Chairman*,
J. R. EBY,
Committee.

Charles L. Scott, 1409 Chestnut street, Philadelphia, Macaroni, (very fine,)	Bronze medal.
G. B. Morse, 912 Arch street, Philadelphia, Bread and rolls,	Diploma.
Lewis & Menges, Philadelphia, baking powder,	Diploma.

It was impossible to test the quality of the concentrated lye exhibited by this firm, therefore, the committee are unable to make any awards. Judging from samples of soap exhibited, made from their lye, we are of the opinion that the same deserves honorable mention.

JOHN H. ZIEGLER, *Chairman*,
J. D. BOAS,
Committee.

GROUP XVIII—NARCOTIC AND ACID PRODUCTS.

Nos. 603 to 621.

W. S. BISSELL, ***President:***

Your committee on Group XVIII beg leave to report the following awards:

John H. Banneher, Egg Harbor City, New Jersey, best collection still wines,	Silver medal.
Julius Hincke, Egg Harbor City, New Jersey, best Franklin and Iollink wines,	Silver medal.
J. B. Seely, best wine from Delaware grapes,	$3
A. M. Pearson, best wine from Concord grapes,	3
W. S. Spencer, best wine from Catawba grapes,	3
Same. Best wine from Isabella grapes,	3
J. B. Seely, best wine from any other variety of grapes,	3

On account of an unfortunate mistake made in the examination of the wines of Julius Hincke, of Egg Harbor, New Jersey, this committee awards him a silver medal for the superior excellence of his "Franklin and Iollink" wines.

Frasch & Co. exhibited the only collection of sparkling wines, but as there was no competition, your committee are of opinion that they would not be justified in awarding a premium.

The largest collective display of native wines was made by the Camden and Atlantic Railroad Company, and deserves honorable mention.

JOHN H. ZIEGLER, *Chairman.*
JOSEPH HEMPHILL,
D. H. NEIMAN,
Committee.

Nos. 600 to 602.

W. S. **Bissell**, Esquire, ***President:***

Your committee on Group XVIII, Narcotic Products, report that no manufactured tobacco was on exhibition. They award the premiums on leaf tobacco as subjoined.

John C. Herman,
A. J. Kauffman.

Jacob Hostetter, Manor township, Lancaster county, eight stalks uncured tobacco, Lancaster county seed leaf,	Diploma.
James Stewart, Lancaster city, ten stalks uncured tobacco, Lancaster county seed leaf,	$3
Skiles & Frey, Lancaster city, two bunches cured leaf tobacco, grown in Lancaster county,	5
J. R. Bitner, Lancaster city, two bunches cured leaf tobacco, grown in Lancaster county,	Diploma.

GROUP XIX—Vegetables and Grasses.

Eli Minch, Shiloh, New Jersey, tomatoes, second premium,	$2
C. B. Rogers, Philadelphia, tomatoes, first premium,	3
Cumberland County Agricultural and Horticultural Society, potatoes, first premium,	20
Same. Red onions, first premium,	3
Same. Cucumbers, first premium,	3
Same. White onions, first premium,	3
Same. Peppers, second premium,	2
Same. Salsify, second premium,	2
Same. Parsnips, second premium,	2
Same. Yellow corn, first premium,	3
Same. White corn, first premium,	3
John Winklespert, Riverside, New Jersey, watermelons, first premium,	5
Same. Cantaloupes, first premium,	5
Solebury Farmers' Club, New Hope, Pennsylvania, field pumpkins, first premium,	3
Same. Sweet pumpkins, first premium,	3
Same. Six bushels Irish potatoes, first premium,	10
Same. Collection of Irish potatoes, first primium,	10
Same. Twelve ears yellow corn, second premium,	2
Same. Three watermelons, second premium,	3
J. M. Longacre, Philadelphia, mangolds, first premium,	3
Same. Egg plants, first premium,	3
Eli Minch, Shiloh, New Jersey, new variety cantaloupe melon, green fleshed, first premium,	5
Samuel F. Pancoast, Syringfield, Pennsylvania, bushel of potatoes, first premium,	3
Factoryville Farmers' Club, Wyoming county, collection of Irish potatoes, first premium,	10
Same. Mangolds, second premium,	2
Same. Carrots, second premium,	2
Same. Garden squashes, second premium,	2
Same. Field squashes, first premium,	3
Same. Yellow fleshed nutmeg, second premium,	3
G. D. Fields, Philadelphia, collection of green vegetables, first premium,	20

Same. Celery, first premium,	3
Same. Rhubarb, first premium,	3
Same. Radishes, first premium,	3
Same. Cucumbers, second premium,	2
Same. Peppers, first premium,	3
Same. Lettuce, first premium,	3
Same. Salsify, first premium,	3
Same. Beets, first premium,	3
Same. Parsnips, first premium,	3
Same. Egg plants, second premium,	2
Same. Squash, first premium,	3
Factoryville Farmers' Club, collection growing grasses and forage, first premium,	10
John Shisler, Farnier cabbage, second premium,	2
Same. Carrots, first premium,	3
Samuel Wilson, Mechanicsville Pennsylvania, Watson's seedling potatoes, first premium,	3
G. D. Field, cabbage, first premium,	3
Same. Spinach, first premium,	3
Same. White table turnips, first premium,	3
Same. Beets, first premium,	5
George Wolf, Plymouth, Montgomery county, one bushel corn,	3

The judges would call attention to the corn of Eli Munch, Shiloh, New Jersey, which, though not competing for premiums, is worthy of notice. Also, that of J. D. Kirkpatrick, which should be mentioned on account of its great productiveness.

The display of cabbage and egg plant from the Camden and Atlantic railroad are particularly noticed. They were delayed in transportation, and did not arrive until too late for competition, or they certainly would have ranked very high. The committee would notice the Sweet Potato Pumpkin exhibited by Eli Munch, Shiloh, New Jersey, which is of unusual size. The new variety of nutmeg melon, of the same exhibitor, is worthy especial notice, as well as of the first premium, which is awarded it, from its fine flavor and productiveness.

They would respectively suggest that all articles of the same number in competition should be placed adjoining one another, and not together with other articles of the same exhibitor.

This would enable the judges to make more correct decisions, as well as materially lessen their labors.

Finally, they would state that they have endeavored to make their awards as justly as possible, having been free from all favoritism and prejudice, so that any errors are those of judgment, and not of will.

ARCHIBALD R. MONTGOMERY, *Chairman.*
WILLIAM S. PANCOAST.

GROUP XX—FRUITS AND NUTS.

To the Executive Committee of the Pennsylvania State Agricultural Society:

GENTLEMEN: Your committee on Group XX beg leave to congratulate the Society upon the fine exhibit of fruit, not only from Pennsylvania, but from the adjoining States. Especially has the exhibit of local societies and farmers' clubs been large, and in every case highly creditable and meritorious. The strenuous efforts made by these organizations to compete for the premiums of this Society is exceedingly praiseworthy, and your committee regret that they are not allowed to award a special premium to each society and club represented.

They respectfully submit for your approval the recommendations, as follows:

Solebury Farmers' Club, best Isabella grapes,	$4
Cumberland County Horticultural Society, best Concord grapes,	4
J. B. Seely, Philadelphia, best Delaware grapes,	4
Same. Best of any variety,	5
Cumberland County Horticultural Society, best Catawba grapes,	4
Solebury Farmers' Club, best four bunches Isabella grapes,	2
Cumberland County Horticultural Society, best four bunches Concord grapes,	2
J. B. Seely, best four bunches Delaware grapes,	2
Same. Best four bunches of any variety,	2
Cumberland County Horticultural Society, best four bunches Catawba grapes,	2
John Schwelt, Cumberland county, best two bunches of any new, hardy variety, (a new seedling,)	$4
Your committee were also much pleased with an exhibit of Moore's Early, exhibited by the same person, and for which we recommend a special premium,	3
Cumberland County Horticultural and Agricultural Society, best collection of native grapes,	7

Apples.

Solebury Farmers' Club, best fall varieties,	$5
Gibson & Bennett, Woodbury, New Jersey, second best fall varieties,	3
E. Satterthwaite, Jenkintown, best winter varieties,	5
Factoryville Farmers' Club, second best winter varieties,	3
Solebury Farmers' Club, basket of not less than six varieties,	6
Same. For best and largest collection,	Diploma.
Cumberland County Horticultural Society, second best and largest collection,	Diploma.
J. A. Nelson, largest variety, special premium,	$20
Same. New variety, special premium,	5

Pears.

E. Satterthwaite, Jenkintown, Pennsylvania, best six summer or fall varieties,	$4
Gibson & Bennett, second best six fall varieties,	3
E. Satterthwaite, best three summer or fall varieties,	3
Gibson & Bennet, second best,	2
Cumberland County Horticultural Society, best five winter or fall varieties,	4
Solebury Farmers' Club, second best,	3
Factoryville Farmers' Club, best three winter or fall varieties,	3
Gibson & Bennett, second best,	2
E. Satterthwaite, best basket,	6
Same. Best and largest collection,	$10 or Diploma.

Peaches.

Cumberland County Horticultural Society, best ten varieties, five each,	$5
E. Satterthwaite, second best,	4

Cumberland County Horticultural Society, best six varieties, five each,	4
Solebury Farmers' Club, second best,	3
Cumberland County Horticultural Society, best three varieties, five each,	3
Solebury Farmers' Club, second best,	2
Cumberland County Horticultural Society, basket of not less than six varieties,	5
Same. Best and largest collection, Diploma or	10
E. Satterthwaite, second best and largest collection,	5

Plums and Quinces.

Cumberland County Horticultural Society, best six plums, one variety,	$3
Same. Best collection plums, half peck,	5
Same. Best three varieties of quinces,	3
E. N. Bowen, New York, second best three varieties,	2
Cumberland County Horticultural Society, best arranged basket,	5

Berries, Nuts, &c.

J. S. Keller, Orwigsburg, Pennsylvania, best quart Wilson blackberries,	$2
E. Satterthwaite, best peck cultivated chestnuts,	2
Cumberland County Horticultural Society, best peck uncultivated walnuts,	1
Same. For the best general assortment of fruits of all kinds, not less than twenty different specimens,	Silver cup.
E. Satterthwaite, for second best,	10

Society Collections.

Cumberland County Horticultural Society, for the best and largest collections of grapes, apples, pears, peaches, and plums, each,	$10

Club Collections.

Solebury Farmers' Club, best club collection of apples,	$10
Cumberland County Horticultural Society, best collection of pears,	10
Same. Best collection of peaches,	10
Same. Best collection of plums,	10
Same. Best collection of quinces,	5
Same. Native grapes, twelve varieties,	10
Same. Native grapes, six varieties,	5
Solebury Farmers' Club, best exhibit of grain, seed, vegetables, and nuts,	25
Cumberland County Horticultural Society, For contributing for exhibition the best and largest collection, &c.,	100

The committee recommend a special premium of $25 to the Cumberland County Horticultural Society, for their display of dried and conserved fruits, and a special premium of a bronze medal to each of the following: Factoryville Farmers' Club, Gibson & Bennett, and the Vineland Fair Association.

Respectfully submitted,

WILLIAM H. EGLE, *Chairman*,
J. D. BOAS.

GROUP XXI—PRESERVES AND PICKLES.

WILLIAM S. BISSELL, Esquire, *President:*

Your committee on Group XXI, preserves and pickles, report the display as meager in numbers, though the articles on display were of superior quality and flavor.

Doctor E. H. Shourds, 1615 North Eleventh street, Philadelphia, fruit, vegetables, meat, fish, and eggs, chemically prepared,	Diploma.
P. J. Ritter, No. 2017 Frankford avenue, Philadelphia, preserved fruits,	$5
Same. Collection jellies,	5
J. S. Keller, Orwigsburg, "prunes," special premium,	1
W. A. Leavitt, corner Gaul and Adam streets, Philadelphia, fruit in jars,	5

(Signed,)
MRS. TOBIAS BARTO,
MRS. T. W. LUDWIG,
T. W. LUDWIG,
Committee.

GROUP XXII—PLANTS AND FLOWERS.

WILLIAM S. BISSELL, Esquire,
President Pennsylvania State Agricultural Society:

SIR: Your committee on plants, trees, designs in cut-flowers, &c., respectfully report, that while the display of cut-flowers was meager and small, it was noticeable for the quality of the cut-flowers and the magnificence of the designs, every piece upon the tables being very artistically and tastefully arranged, reflecting great credit upon the exhibitors, and rendering it very difficult for your committee to decide upon the relative merits of the designs.

Plants and trees were fairly represented, and the whole combined made a very respectable exhibition.

New plants of interest were represented by the new Coffee Plant, (*Coffea Libirica*,) exhibited by Edward S. Morris, with a view to its introduction into California, where it is expected it will, in the near future, become a valuable article of commerce.

The evergreens on exhibition, contributed by Messrs. Buist, Moon, and Meehan, were very interesting.

The premiums awarded by your committee are hereby respectfully submitted.

JOHN MURDOCH, junior.
CHARLES H. MILLER,
JOSEPH LEWIS,
ROBERT KILVINGTON,
Committee.

The following is a list of the awards:

R. H. Sherwood, best collection plants in flower, first premium,	$10
John Dick, Philadelphia, best collection of green-house plants, first premium,	20
Same. Best collection agaves and castors, first premium,	3
R. Buist, junior, best collection foliage plants, first premium,	10
R. H. Sherwood, second best collection,	5
R. Buist, junior, best collection palms,	5
Gibson & Bennett, best tuberose,	2
Same. Special display evergreens,	8

E. S. Morris, best new plant,	3
H. A. Dreer, best collection dried grasses,	3
R. Buist, junior, best collection tree and herbaceous ferns,	10
T. P. Warnick, cross, wreaths, and horseshoe, (special,)	2
John Plender, three funeral pieces of immortelles,	3
M. M. Bayersdorfer & Co., general display of florists' supplies,	3
R. Buist, senior, Philadelphia, rare evergreens,	10
William H. Moon, Morrisville, Bucks county, Pennsylvania, display of evergreens,	5
John Dick, Philadelphia, collection drocenas,	5
Thomas Meehan, Germantown, Pennsylvania, evergreens, trees, and shrubs,	Honorable mention.

Cut-Flowers and Designs.

Laroche & Stahl, floral bell,	$20
Z. W. Turnley, large funeral design,	10
J. Kift & Son, floral bee-hive,	10
J. Plender, two pyramidal boquets,	5
Same. Funeral pillow,	5
Pennock Bros., column,	15
H. A. Dreer, collection petunas,	3
Same. Phlox,	3
Pennock Bros., three funeral designs,	5
LaRoche & Stahl, funeral design,	3
Craig & Bro., design in flowers,	10
John Plender, design in cut-flowers,	5
Same. Funeral designs,	3
Pennock Bros., cut flowers,	3
H. A. Dreer, wreath,	3
John Plender, cross,	3
H. A. Dreer, cross,	2
John Plender, basket cut-flowers,	5

WILLIAM S. BISSELL, Esquire,
President Pennsylvania State Agricultural Society:

Your committee on special display of cut-flowers, designs, &c., Wednesday, September 17, 1879, respectfully report the following, and ask your concurrence:

Kift & Son, Philadelphia, butterfly and frame, first premium,	$50
Pennock Bros., Philadelphia, floral belfry, third premium,	20
F. LaGuerse, Philadelphia, monument, second premium,	30
Peter E. Sheets, Philadelphia, funeral designs, three pieces, first premium,	20
John Plender, Philadelphia, crown, wreath and star, second premium,	10
Theo. P. Warnick, Philadelphia, crown, anchor and pillow,	5
E. Weiss, Philadelphia, wreath, first premium,	5
John Plender, Philadelphia, pyramid bouquet, first premium,	5
Same. Hand bouquet, first premium,	5
G. W. Turnley, wreath, second premium,	3

SPECIAL PREMIUMS.

John Plender, Grant's chair,	$10
W. F. Faust & Son, artillery gun,	10

LaRoche & Stahl, Philadelphia, ship and stand,	10
John Hudson, Philadelphia, harvest over,	10
Thomas Robinson, Philadelphia, ship,	5
G. W. Turnley, Philadelphia, bouquet,	1

JAMES RITCHIE,
ANDREW DRYBURGH,
ROBERT BUIST,
CHARLES H. MILLER,
Committee.

GROUP XXIII—WOVEN AND FELT FABRICS.

WILLIAM S. BISSELL, ESQ., *President, &c.:*

Your committee on Group XXIII, award premiums as follows:

W. A. Drown & Co., 246 Market street, Philadelphia, parasols, Silver medal.
Mrs. E. T. Reed, Scranton, two stands with corsets attached, Bronze medal.
Haveflich & Co., 1306 Market street, Philadelphia, carpets, Silver medal.

The displays made by Garitee, Martin, and Allen, of clothing, Homer, Colladay & Co., of fine dry goods, and Sharpless & Son, of fine and imported dry goods, all of Philadelphia, although not entered for competition, deserve special mention, and would, doubtless, had they been entered in their proper groups, have received the highest awards.

Your committee desires to employ this method of calling attention to their fine and creditable display.

(Signed) WILLIAM H. HOLSTEIN, *Chairman,*
MRS. JOHN C. MORRIS,
MRS. S. E. FAUNCE,
Committee.

GROUP XXIV—APPAREL.

WILLIAM S. BISSELL, ESQ., *President, &c.:*

Your committee on apparel, Group XXIV, after a thorough and careful examination of the articles entered in this group for competition, respectfully submit the following report as the result of their labors:

E. S. Matlack, 1941 Hamilton street, Philadelphia, knitted quilt,	$2 50
Miss Annie Saffer, 712 Tasker street, Philadelphia, Union motto quilt, stars and stripes quilt,	2 50
Mary E. Huhn, 3504 Market street, Philadelphia, lace pillow shams, five lace tidies, one apron,	5 00
E. Bardenwisper, 23 South Eighth street, Philadelphia, white shirts,	2 50
Mrs. Fellenbaum, 2114 Cherry street, Philadelphia, collection of needlework,	2 50
Mrs. Amanda Albright, Orwigsburg, Schuylkill county, Pennsylvania, honey comb toilet set, &c.,	2 50
Laura J. McNair, 214 Main street, Camden, New Jersey, fine needlework,	2 50
Miss Kate M. Frantz, 1740 North Fourth street, Philadelphia, knit white counterpane,	2 50
Miss Mary A. Still, 1515 North Twenty-first street, Philadelphia, fine needlework, &c.,	5 00
Miss A. Wister, 3702 Haverford street, Philadelphia, hair flowers,	2 50
Miss Mary E. Landis, Philadelphia, two square canvas tidies,	2 50
Mrs. Travilla, Philadelphia, afghan,	2 50
Mrs. S. J. Grimshaw, 809 South Second Street, Philadelphia, silk quilt,	2 50

Miss Lizzie H. Grimshaw, 809 South Second street, Philadelphia, two afghaned sacques, one coverlet sacque,	2 50
Edith Lukens, 933 Melon street, Philadelphia, knitted bed spread, shell pattern,	Bronze medal.
Conrad Brother, 1107 Chestnut street, Philadelphia, shirts, collars, cuffs,	Bronze medal.
Joseph Gilbert, 829 Arch street, Philadelphia, dress shirts, collars, cuffs, &c.,	Bronze medal.
Charles Neher, 612 Arch street, Philadelphia, hair jewelry,	Bronze medal.
Mrs. S. J. Meloy, 114 North Third street, Philadelphia, art needlework,	Bronze medal.
Miss Mary C. Trabert, Churchtown, Pennsylvania, hairwork,	Bronze medal.
Mrs. M. H. Bergen, Brooklyn, New York, dress elevator,	Bronze medal.
Mrs. D. T. Sozuisky, 2210 Fairmount avenue, Philadelphia, fine and ornamental needlework,	Bronze medal.
R. N. England, 3504 Market street, Philadelphia, hand-wrought collars, cuffs, &c.,	Bronze medal.
Mrs. Samuel E. Faunce, 253 North Forty-first street, Philadelphia, English point lace,	Bronze medal.
J. L. Young, 2206 Walnut street, Philadelphia, Knight Templar and Masonic goods,	Diploma.

The following deserve honorable mention:

Miss Amanda Albright, Orwigsburg, Schuylkill county, Pennsylvania, crochet bed spread, made of number eight cotton thread.

Miss Mamie Ross, 665 Brooklyn street, Philadelphia, fancy lamp shade.

Harriet Patterson, 3805 Centre street, Philadelphia, tatting pillow shams.

Josephine P. Lippincott, 334 Franklin street, Philadelphia, panel embroidery picture.

Mrs. Eliza Arner, Harrowgate lane, Philadelphia, rag rug.

Miss Annie Saffer, 712 Tasker street, Philadelphia, hand-knit stocking and half hose goods.

A. E. Diehl, 665 Brooklyn street, Philadelphia, infant sack.

William H. Holstein,
Mrs. William H. Holstein,
Mrs. John C. Morris,
Commiteee.

GROUP XXV—Household Machines.

Your committee respectfully beg leave to report quite a limited exhibit of the within enumerated articles in this group. The American Button Hole and National Sewing Machine Companies exhibit machines of peculiar excellence.

The awards in detail are annexed.

(Signed) W. W. Speer, *Chairman*,
John M. Steele,
D. M. Camprey,
J. D. Kirkpatrick.
Committee.

J. S. Losch & Co., Philadelphia, washing machine and tub,	Diploma.
A. E. Worden & Co., washing machine and kitchen table, with ironing board attachment,	Diploma.
National Sewing Machine Company, Philadelphia, sewing machines and buttonholing overseaming,	Diploma.
F. J. Bayer Philadelphia, steam washer,	Diploma.

American Buttonhole Company, Philadelphia, machine for button holes, ... Diploma.

GROUP XXVI—TABLE WARE.

To the President of the Pennsylvania State Agricultural Society:

We, the undersigned, a committee on awards on Group XXVI, Department 3, beg leave to say that we have examined all the goods in this department, and make the following report:

Gillender & Sons, 135 Oxford street, Philadelphia, collection table glassware, ... Silver medal.

Charles Conrad, 224 Vine street, Philadelphia, gilded, silver-plated, and bronzed metal goods, ... Bronze medal.

William Wilson, S. W. corner Fifth and Cherry streets, Philadelphia, sterling silver ware, electro silver-plated ware, ... Silver medal.

S. J. Merchant, 821 Cherry street, Philadelphia, cut and engraved glass of all description, ... Bronze medal.

Herman Folkers, 1109 Chestnut street, Philadelphia, china and glass ware, ... Bronze medal.

A. Ledig & Son, 248 N. Eighth street, Philadelphia, silver-plated ware, ... Silver medal.

JOHN S. MILLER, *Chairman*,
JOHN J. NISSLEY,
D. Y. WILSON,
Committee.

GROUP XXVII—HOUSEHOLD FURNITURE.

WILLIAM S. BISSELL, Esq., *President, &c.:*

Your committee on Group XXVII, household furniture, have carefully attended to the duties assigned them, and, after mature deliberation, make the following report:

Henry D. Cook, 930 Noble street, Philadelphia, one bureau, commendable for excellence of workmanship, and writing desk attachment, Honorable mention.

M. Gould & Sons, No. 8 N. Sixth street, Philadelphia, brass work—stair rods, bedsteads, cribs, fenders, candlesticks, &c., commendable for durability, design, and finish, ... Bronze medal.

Aromatic Pino Palmine Mattress Company, 15 N. Front street, Philadelphia, Pino Palmine mattress, commendable for preparation of material, elasticity, and pleasant aroma, ... Bronze medal.

J. J. Ray, 919 Chestnut street, Philadelphia, portable washstands, commendable for style of construction and ingenious pumping apparatus. Very desirable for use in country houses, . Bronze medal.

A. E. Worden & Co., 727 Arch street, Philadelphia, Ladies' Favorite washing machine, commendable for thoroughness of action, Bronze medal.

Eliza H. Schofield, 21 N. Tenth street, Philadelphia, bouquet table, slate top, painted in oil. Wreath of flowers, very beautifully executed, ... Honorable mention.

Joseph Landis, Doylestown, Pennsylvania, combined portable fence, gate, and pen, commended as of very good design for temporary pasture, ... Honorable mention.

William Wiler, 225 S. Fifth street, Philadelphia, stair rods, curtain fixtures, brass fixtures, commended for good design and workmanship, Honorable mention.

Frank J. Boyer, 108 North Seventh street, Philadelphia, steam washer, commended as an invention greatly simplifying labor in the laundry, ... Diploma.

A. Rimby, 1548, North Seventh street, Philadelphia, combined feed steamer and clothes washer, commended as well adapted for farm purposes, large families, or small hotels, ... Bronze medal.

James S. Murphy, 1024 Lombard street, Philadelphia, bronze table and pin screws, commended for originality of design, . . Bronze medal.

Jones & Griffith, 259 South Second street, Philadelphia, American spring bed bottom, commended for style of spring construction, and attachment of the same, the springs being readily removed, thus allowing frequent and thorough cleaning; the design being such as to obviate all possibility of fouling, ... Bronze medal.

William F. Burr, 619 Walnut street, Philadelphia, Rhyston mangle, commended for durability and simplicity of construction. An invention greatly simplifying the labor of the laundry, . . Bronze medal.

Isidor Brach, 916 Spring Garden street, Philadelphia, Union water filter, syphon attachment, filters for attachment to hydrants and refrigerators, commended for originality of design, thoroughly filtering and deodorizing foul water, ... Bronze medal.

H. J. Lash, 450 North Twelfth street, Philadelphia, convertible washboard and clothes wringer, ... Honorable mention.

D. D. Shupe, 812 Market street, Philadelphia, climax folding beds, commended for excellence of design. Convertible into imitation side-boards, bureaus, or parlor organs, ... Bronze medal.

C. Guyer, Tyrone, Pennsylvania, The Perfect Washer, commended for simplicity, ... Honorable mention.

W. J. Cunningham, 1533, Ridge avenue, Philadelphia, American Filter Company, filters for use in hotels, paper factories, dye-houses, and wherever large amounts of water are required, filtering material of pure sand, commended for excellence of design and capacity, Bronze medal.

Samuel F. Glaze, Frederick city, Maryland, invalid bed, commended as being ingenious and practical, and deserving of the highest award, ... Silver medal.

A. W. Peterson, Germantown road and Second street, Philadelphia, Union filter and water cooler, filter and deodorizer of high merit, Diploma.

Same. Water cooler, arranged for a saving of ice, and a guard against impurities from the same, ... Bronze medal.

BURNETT LANDRETH,
EDWARD THOMAS,
A. C. WILLITS,
ALFRED WILLITS,
Committee.

WILLIAM S. BISSELL, ESQ., *President, &c.:*

Your committee appointed to examine exhibits and entries in groups XXVIII and XXIX, beg leave to submit the following report:

The entries in these departments reflect credit not only to exhibitors but upon the Society. After a very careful examination, your committee have awarded as certified in the book. We would call your attention especially to the exhibits of the Pennsylvania Heat and Light Company, and the Whitney Manufacturing Company.

Respectfully,
J. D. KIRKPATRICK,
JOHN M. STEEL.

GROUP XXVIII—Heating, Ventilating, and Cooking.

The following is a list of the awards:

Theodore Leonhard, Patterson, New Jersey, wax tapers, sheet wax, Special mention.
Same. Lamps for heating and cooking, ... Diploma.
William W. Goodwin & Co., Philadelphia, water heating apparatus, Bronze medal.
Same. Gas stoves, ... Diploma.
James P. Wood & Co., Philadelphia, range and heating stove, &c., Bronze medal.
Whitney Manufacturing Company, Philadelphia, oil cooking stove, Bronze medal.
Pennsylvania Heat and Light Company, Philadelphia, retorts in stoves and ranges, ... Silver medal.
George R. Moore, Philadelphia, gas jet ventilators, ... Diploma.
Henry Nunzio, Philadelphia, coffee pots, ... Diploma.
H. A. Willis, Philadelphia, steam cooker, ... Diploma.
Pennsylvania Heat and Light Company, Philadelphia, hydro carbon light for lighting, ... Silver medal.
The A. W. Rand Company, Philadelphia, range with sewer gas deodorizer, ... Diploma.
Same. Second best gas machine, ... Bronze medal.

GROUP XXIX—Artificial Illumination.

E. M. Lowden, Philadelphia, lamps for heating and cooking, . . Diploma.
J. T. Shuster, Philadelphia, mineral wick, and burner, . . Diploma.
The A. W. Rand Company, Philadelphia, Model Victor gas machine, Bronze medal.
Pennsylvania Heat and Light Company, Philadelphia, hydro carbon light for lighting parks, &c., ... Silver medal.
J. P. Hayes, 18 North Ninth street, Philadelphia, naptha paint burners, ... Special mention.
Herman Folkers, 1109 Chestnut street, Philadelphia, student lamps, Diploma.
Maqueen Manufacturing Company, 706 Market street, Philadelphia, house furnishing wire goods, ... Diploma.

GROUP XXX—Clearing Land and Working Wood.

To the President of the Pennsylvania State Agricultural Society:

We, the members of the committee to judge of the merits of the exhibits in Department 4, Group XXX, do respectfully inform you that we have endeavored, to the best of our ability, to perform the said duties. We think the exhibit made by William Walter's Sons, of Philadelphia, of wood-working tools, is well worthy of a Silver Medal, on account of having the best designs and latest improvements. To A. C. Cotton & Sons, of Vineland, New Jersey, exhibit of Davis Rock and Stump Extractor, we would award a Bronze Medal, on account of its simplicity, efficiency, and cheapness. And to the exhibit of Alfred J. Cotton, of Philadelphia, we would award a Bronze Medal, one account of having the best design and quantity of planes.

(Signed) J. S. Haldeman,
William H. Harrison,
Committee.

GROUPS XXXI AND XXXII—REMOVING AND BREAKING STONE, AND WORKING CLAY.

To the President of the Pennsylvania State Agricultural Society:

We, the undersigned, a committee on awards, in Groups XXXI and XXXII, beg leaave to state that we have examined all the articles in these departments, and make the following awards:

J. Milner and L. M. Maine, No. 251 South Fourth street, Philadelphia. Pierce Well Extractor, for boring wells, . . . Bronze medal.
S. R. Kennedy, No. 1740 North Sixth street, Philadelphia, Artesian well boring tools, ... Bronze medal,
S. Williams & Son, No. 2200 North Tenth street, Philadelphia, tools and implements for making brick, ... Bronze medal.
Henry Martin, No. 408 South Prune street, Lancaster, brick machine, Silver medal.

(Signed) JOHN A. LEMON, *Chairman.*
JOHN S. MILLER,
Committee.

GROUP XXXIII—MOTORS AND MEANS OF TRANSMITTING POWER.

WILLIAM S. BISSELL, Esquire, *President, &c.:*

Your committee on Groups XXXIII and XXXIV have found it a very difficult matter to make a very satisfactory report on the awards of the several articles included in the classes of machinery assigned to them for examination, there being so few articles that have had any competition to contend with.

The following is a list of the awards in Group XXXIII, "Motors and Means of Transmitting Power:"

P. P. Mast, 216 Broad street, Philadelphia, windmill for pumping, Diploma.
C. Aultman & Co., Canton, Ohio, Canton monitor portable engine, Silver medal.
A. B. Farquahr, York, Pennsylvania, light lever power, . . . Diploma.
J. C. Cline, 806 Carlisle street, Philadelphia, turbine water wheel, Diploma.
George Canby, windmill, (standard,) . . . . Silver medal.
Alfred Box, patent double screw hoists, ... Diploma.
S. W. Kennedy & Son, wind engine, ... Silver medal.
Lloyd, Supplee & Walter, Holland's patent garden pump, . . Diploma.
Lovegrove & Co., Portable engine and boiler, ... Diploma.
Same. Vertical engine and boiler, ... Diploma.
Aaron Wissler, Lancaster county, Pennsylvania, horse power, Bronze medal.
American Boiler Pipe Covering Company, portable covering for boiler and pipes, ... Bronze medal.
Ruffner & Dunn, Schuylkill Falls, Pennsylvania, boiler tube cleaner, Bronze medal.
Same. Nut lock, ... Diploma.
John Deakin, steam trap, ... Diploma.
Nicols, Shephard & Co., Battle Creek, Michigan, portable steam engine, ... Silver medal.
Heebner & Sons, Lansdale, Pennsylvania, double tread power, Bronze medal.
F. Hershey, Lancaster, Pennsylvania, portable engines, . . Silver medal.
Same. Wheel truck, ... Diploma.
James H. Allen, Carbon county, Pennsylvania, hinge belt coupling, Bronze medal.

Burgess & Co., 20 Ridge avenue, Philadelphia, covering for steam pipes and generators, ... Bronze medal.

GROUP XXXIV—Raising and Forcing Water and Compressing Air.

The following is a list of the awards in Group XXXIV:
C. G. Blatcheley, Philadelphia, wood pumps, ... Diploma.
P. P. Mast, Philadelphia, lift and force pump, ... Diploma.
A. B. Farquhar, York, Pennsylvania, windlass, with bucket and chain, for wells, ... Bronze medal.
H. H. Heise, Columbia, Pennsylvania, hydraulic ram, ... Diploma.
J. B. Millington & Son, hydraulic ram, ... Diploma.
Shoener & Allen, Tamaqua, Pennsylvania, model of air compressor, Bronze medal.
Fire Extinguisher Manufacturing Company, two two-wheel chemical engines, ... Bronze medal.
Same. Four portable chemical fire extinguishers, ... Diploma.

In the articles of endless floor horse powers, we find a number of first-class machines, but inasmuch as there was so much similarity between them, both in design and workmanship, your committee were unable to make an award without doing either one or the other of the exhibitors an injustice, and we would therefore recommend that they each have a diploma awarded them, or that they receive special or favorable mention. You will observe that in one instance we have recommended a bronze medal on the Heebner & Son machine, on account of the automatic safety attachment, as applied to the same.

W. B. Culver,
I. K. Becker,
Charles W. Erwein,
Committee.

GROUP XXXV—Making, Repairing and Sharpening Tools.

W. S. Bissell, Esquire, *President, &c.:*

Your committee make the following awards on Group XXXV, making, repairing, and sharpening tools:
Ryder & Co., Chambersburg, Pennsylvania, portable furnace washer, Diploma.
H. B. Kesper, Lancaster, Pennsylvania, blacksmith's lever fan, . . Diploma.
Day Brothers, Philadelphia, collection blacksmith tools, ... Diploma.
Same. Blacksmith's hand fan blower, ... Diploma.
Same. Portable blacksmith's forge, ... Bronze medal.
J. B. Shannon & Son, Philadelphia, knife grinder, ... Bronze medal.

W. B. Culver,
I. K. Becker,
Charles W. Ervein,
Committee.

GROUP XXXVI—Tillage.

Wiard Plow Company, Batavia, New York, collection of plows, Diploma.
S. L. Allen & Co., Philadelphia, display of agricultural implements, Diploma.
Frederick Hogan, Pauling, Pennsylvania, riding cultivators and attachments, ... Honorable mention.
Nash Brother, Harrisburg, Pennsylvania, pulverizer, crusher, and leveler, ... Bronze medal.

Syracuse Chilled Plow Company, Syracuse, New York, collection of plows,	Silver medal.
Same. Side hill plow,	Bronze medal.
Baltimore Plow Company, collection of plows,	Honorable mention.
A. B. Farquhar, York, Pennsylvania, gang plow,	Bronze medal.
Same. Sulky cultivator and plow combined,	Bronze medal.
Arad Barrows, junior, Philadelphia, field roller,	Diploma.
W. H. Jones, Philadelphia, collection of plows,	Honorable mention.
A. Speer & Son, Pittsburgh, Pennsylvania, collection of plows,	Honorable mention.
Same. Cultivator,	Diploma.
South Bend Chilled Plow Company, Indiana, collection of plows,	Honorable mention.
A. Speer & Son, Pittsburgh, Pennsylvania, horse plow,	Bronze medal.
Same. Sub-soil plow, (walking),	Bronze medal.

The display of the South Bend Plow Company came in after the committee had adjourned on Friday—the delay was occasioned by the railroads—therefore did not come in competition. Suffice to say that this company is deserving of great praise for their fine exhibit of plows.

The very elegant display of plows by the Syracuse Plow Company was a feature in the exhibition—it was tastefully arranged, and was very attractive. The large number and variety of styles was the best display in that line.

GROUP XXXVII—PLANTING.

P. P. Mast, Philadelphia, grain and fertilizer drill combined,	Silver medal.
Asay & Wood, Philadelphia, corn planters,	Honorable mention.
Benson, Maule & Co., Philadelphia, seed sowers,	Bronze medal.
Harrisburg Car Manufacturing Company, grain drill,	Bronze medal.
New York Plow Company, New York, harrow,	Diploma.
D. M. McSherry, Dayton, Ohio, grain drill,	Honorable mention.
Bickford & Hoffman, Macedon, New Jersey, grain and fertilizer drill,	Diploma.

The "Farmers Favorite Grain Drill." This drill appears to be calculated to do more work than any other on exhibition, although not on the ground in time for the committee to examine its extraordinary merits, we would respectfully suggest that a diploma be awarded it from the fact that said delay in the goods reaching the grounds in time for competition.

To the President and Executive Committee:

GENTLEMEN: Your committee appointed to adjudge and award in groups XXXVI and XXXVII, beg leave to submit the following:

After three days labor, without interruption, we have, to the best of our ability, impartially examined, and awarded on entries in said classes, the exhibits being distributed in various parts of the building, added very materially to the labors of your committee; but with the assistance of your kind and obliging superintendent of the department, Thomas G. Janvier, we have been able, we hope, to examine all exhibits coming directly in our groups. We certainly must congratulate the Society upon the success in this department at this their first exhibit in the Centennial building. For the kindness and attention of exhibitors given your committee, whilst in the discharge of their duties, we return thanks.

DAVID H. BRANSON,
THOMAS WOOD,
SAMUEL DICKEY,
DAVID FADDIS,
Committee.

EXHIBITION BUILDING,
PHILADELPHIA, *September 15, 1879.*

The President and Executive Committee of the Twenty-sixth Annual Exhibition of the Pennsylvania State Agricultural Society:

GENTLEMEN: Your committee of judges on awards of premiums of articles and machines, (Department 4, Group XXXVIII,) gathering crops, respectfully submit the following report:

Said report, we fear, will, perhaps, not be as elaborate and complete as the Society might desire, but from the fact that two of the original members of the committee, Mr. Kincaid, of Erie county, chairman, and Mr. Yakel, of Hollidaysburg, Pennsylvania, not having put in an appearance at all, the new formed committee, with Mr. Steel, of Westmoreland county, added to the present chairman. The judges did not get fairly to work until Friday noon. Therefore, we found it out of the question, for want of time, to make any detailed report of the special merits of each particular machine; but took all the time left to us, to critically examine the merits of each article, (some seventy-five in number,) and scattered all over the building, we having, in many cases, no time for notes. We, therefore, just passed on the machines according to their merits, and have awarded the premiums according to our best judgment, to the machines and not to the exhibitors.

We have decided to pass on the machines in order, as in catalogue, (and not as written in paper book,) commencing with best mowing machines.

The machine exhibited by Messrs. W. F. Lippincott & Son, of Woodstown, New Jersey, and made by W. A. Wood, of Hoosack Falls, New York, is entitled to a bronze medal.

This is a new inclosed gear machine, with valuable improvement in cutting apparatus, loose driving wheel with ratchet. The draught of machine is light, being driven from the main frame; the journals run in brass boxes, durable and strong, being well braced with wrought iron; not liable to get out of order, being excellent in design and manufacture, and well calculated to do the work for which designed, in our judgment, is better than any other on exhibition.

Next in order is the combined reaping and mowing machine exhibited by C. Aultman & Co., and known as the Buckeye. Entitled to a Bronze medal.

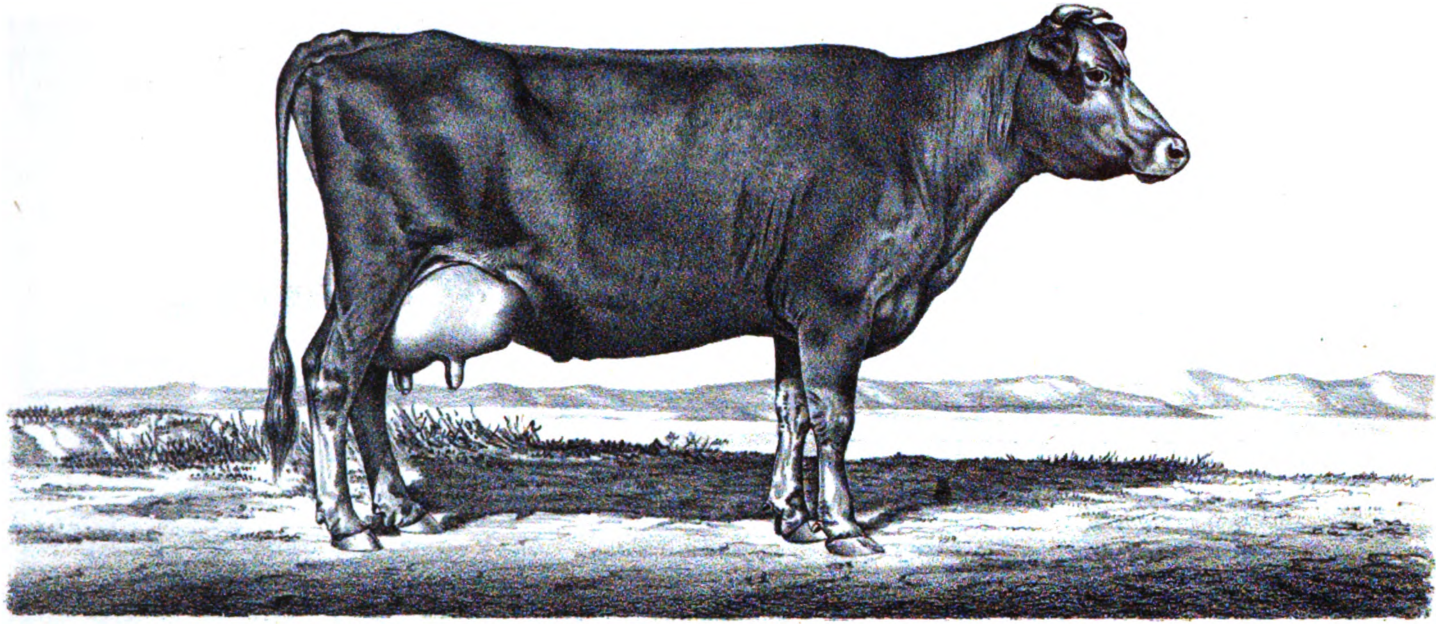
The Buckeye table rake combined machine has a peculiar and an efficient improvement in straightening the grain before delivering it on the ground. The machine is light and strong, can be changed in a few moments to reaper from mower, and *vice versa*, without heavy lifting. Convenient for driver to change any part without getting off the seat, in raising and lowering. We decide it the best machine of its kind on exhibition.

Best mowing and reaping machine, self-binder, William F. Lippincott & Son, Woodstown, New Jersey, entitled to a silver medal.

This machine is built by Walter A. Wood, New York, and is entirely new. The binder attachment has an adjustable reel, while in motion elevates its grain with double canvas. The harvester is balanced nicely, which obviates side draught, raises and lowers with a simple lever, is light, compact, and simple in construction. The binder ties with wire, using one spool and making but one twist, is simple of construction, being clear of springs. We decide it to be the best of its kind on exhibition.

The second best reaping and mowing machine, self binder.

We award Bronze medal to D. M. Osborne & Co. Their machine is much like Wood's. It is certainly second best, and therefore entitled to a Bronze medal.



Jersey Cow

"BLACK BESS"

Owned by Charles L. Sharpless, Philadelphia.

FIRST PRIZE PENNSYLVANIA STATE FAIR, PHILADELPHIA 1879.

Mowing and reaping machine, self raker.

Walter A. Wood's Junior Sweep Rake Reaper, cutting on a line with driving wheels, folding table, and seat. Has five rakes, with automatic gear for controlling the movement of the rakes, by means of a convenient lever. The driver can, at will, without leaving his seat, control the raking, causing every second, third, fourth, or fifth rake to act. This machine, in all its parts, and for the work which it has to do, is decidedly the best on exhibition, and is entitled to a Bronze medal. Is entered by William F. Lippincott & Son.

Binder attachment to reaping machine.

E. W. Jenkins' cord binding attachment, we have decided, is clearly entitled to a silver medal. The machine invented and entered by himself, is simple, durable, and economical in construction, it will bind any size sheaf, ties a perfect bow knot with any kind or size of string or cord, and can be easily attached to any size reaper. We think it is a most valuable and ingenious invention.

Lawn Mowers.

The Pennsylvania lawn mower, entered by Lloyd, Supplee & Walton, is decidedly the best, and entitled to a diploma.

Points.—Open wiper, or cutter bars, skeleton cylinders, with four knives, small journals, and long bearings, thereby reducing friction; the machine is constructed of steel, wrought, and malleable iron; all the movable parts of the machine can be adjusted without taking it apart; it has loose wheels, with ratchets, so as to turn corners; it has no springs, is light of construction, but strong and durable. It will, we believe, wear longer, do the work better, with less labor, than any other machine. One of the peculiarities is, that it will cut higher grass than any other one. It is the best on exhibition.

Grain Cradles, Scythes, and Snaths.

None entered in paper book.

Horse Hay Rake.

The horse hay rake made and entered by B. A. Taylor, of Dayton, Ohio, is decidedly the best exhibited, and entitled to a bronze medal. The many advantages this rake has over all others on exhibition are so numerous that time will not permit of a minute description of them. We, therefore, simply pronounce it the best.

Hand Hay Rakes.

None entered.

Self-Loading Hay Wagon.

But one entered, by Nash Brothers, and patented by Foust. It is light, and simple of construction, durable, will do its work well, and is entitled to a silver medal.

Best Fork and Fixtures for Unloading Hay or Straw.

Fitzhugh's American Hay Elevator, entered by Conrad & Murray, Thirtieth and Chestnut streets, Philadelphia, is decidedly the best exhibited, and is entitled to a bronze medal. This machine is like many others whose advantages are so superior to all others. We have not taken the time to point out in detail any of them, but pronounce it the best.

Best Potato Digger.

Of A. Speer & Son, of Pittsburgh, Pennsylvania, is simple, strong, and beautifully designed, and constructed, durable, will do its work well and easy, and is entitled to a bronze medal.

Gleaner and Binder.

Entered in paper book, but not in catalogue.

The one entered by the Grain Binder Association, Norristown, Pennsylvania, is an ingenious invention, and commends itself as being one of the most practical and economical for general use, because of its simplicity and adaptability to do the work for which it was designed. It will be the most desirable on the larger farms, where unskilled labor is mostly employed, while its low price, (being only about one half of that of the combined machines,) brings it within the reach of smaller farms. It is also adapted to bind gavels or swaths, after the entire field has been cut and cured. We give it our highest recommendation, and think it should have a bronze medal.

J. R. Fitzhugh, double and single harpoon fork,	Bronze medal.
C. D. Richardson & Co., Philadelphia, corn harvester,	Bronze medal.
Common Sense Band Cutter Company, Norristown, Pennsylvania, grain band cutter,	Bronze medal.
Lawson & Brenizer, Philadelphia, had on exhibition the best hay and manure forks, and certainly deserve the highest award, a	Silver medal.
J. M. Burdick, hay tedder,	Bronze medal.
E. C. Brinser, Middletown, Pennsylvania, grain cradles,	Diploma.
Central Manufacturing Company, Lewisburg, Pennsylvania, Bates' harvester,	Bronze medal.

Nash & Brother, Harrisburg, Pennsylvania, Bullard hay tedder, simple in design and construction, durable and efficient, will do its work for which it is designed, more easily and better, in our judgment, than any other. We think it entitled to a diploma.

Respectfully yours,
H. L. HOFF, *Chairman*,
WILLIAM STEEL.

GROUP XXXIX—PREPARING PRODUCTS FOR MARKET, AND CONSUMPTION.

A. B. Farquhar, York, Pennsylvania, corn-stalk cutter,	Second premium.
Same. Wine press,	Diploma.
Hegganum Manufacturing Corporation, root cutter,	First premium.
S. C. Harbert, Philadelphia, fodder cutter,	Diploma.
W. H. Jones, 1621 Market street, Philadelphia, cider mill,	Diploma.
Pennock Manufacturing Company, Kennett Square, Pennsylvania, corn sheller,	Diploma.
T. G. Smedley, Willistown Inn, Chester co., Pa., hay cutters,	Diploma.
E. T. Cope & Sons, West Chester, Pennsylvania, iron water troughs,	Diploma.
E. Craft & Co., Philadelphia, granite, iron, cooking, and dairy utensils,	Diploma.
Same. Churns,	Diploma.
Same. Novelties in housekeeping articles,	Diploma.

Same. Ice cream freezer, ... Diploma.
Same. Brass and japanned bird cages, ... Diploma.
J. Sedgebeer, Painesville, Ohio, portable bone-mill, . . . Silver medal.
Aaron Wissler, Brunerville, Pennsylvania, separator and thresher combined, ... Bronze medal.
Riehle Brothers, Philadelphia, testing machine, ... Silver medal.
W. L. Boyer, Philadelphia, farm grist-mill, ... First premium.
New York Plow Company, New York, root cutter, . . . First premium.
Fairbanks & Co., Philadelphia, large and small scales and weights, Diploma.
E. S. Morris & Co., Philadelphia, coffee hulling machine, . . . Diploma.
J. C. Baker & Co., Philadelphia, Pony corn sheller, ... Diploma.
Geiser Manufacturing Company, Waynesboro', Pennsylvania, thresher and separator, ... Silver medal.
A. B. Farquhar, York, Pennsylvania, six-horse thresher and separator, Diploma.
C. H. R. Friebels, Philadelphia, butter worker, ... Diploma.
J. B. Marquis, Norwich, New York, milk pans, and vats for butter and cheese, ... Silver medal.
Charles K. Butterick, portable vertical burr farm mill, ... Diploma.
B. Gill & Son, Trenton, New Jersey, rye thresher, ... Diploma.
Same. Two-horse thresher and shaker, ... Bronze medal.
Dagert Grady, Norristown, "Burgess air clipper," . . . . Bronze medal.
J. H. Shimer, Hummelstown, Pennsylvania, grain fan and separator, Honorable mention.
Lovegrove & Co., 152 N. Third street, Philadelphia, separator and cleaner, ... Honorable mention.
Pitt Agricultural Works, Buffalo, New York, thresher and cleaner, Honorable mention.
A. C. Phillips, Philadelphia, portable burr grinding mill, . Bronze medal.
B. R. Rapp & Co., West Chester, machine for printing butter, . Diploma.
American Fruit Dryer Company, Chambersburg, Pennsylvania, fruit evaporator, ... Bronze medal.
Riehle Bros., Philadelphia, portable platform scales, . . . Bronze medal.
New York Plow Company, New York, root cutter, ... Diploma.
D. K. Hatfield, Pottstown, Pennsylvania, threshing machine, . . Diploma.
Hulshizer & Larzelere, Doylestown, Pa., thresher and cleaner, Bronze medal.
J. C. Dell, Philadelphia, coffee and spice-mills, ... Bronze medal.
B. S. Goddard, Philadelphia, model for hay and cotton press, Bronze medal.
Alexander Anderson, Philadelphia, hand feed cutter, ... Diploma.
Nichols, Shepard & Co., Battle Creek, Michigan, threshing machine and separator, ... Honorable mention.
Priest, Page & Co., Philadelphia, assortment of scales—Howe scales, Silver medal.
Priest, Page & Co., Philadelphia, scales for weighing leather, Silver medal.
Boomer, Boschert & Co., Syracuse, New York, cider press, . . . Diploma.
Lewis Strayer, York, Pennsylvania, portable grist-mill, Honorable mention.
A. Wolf, middlings purifier, ... Honorable mention.
Marcus P. Schenck, Fulton, New York, cider-mill, ... Diploma.
George W. Schubert, 3527 Market street, Philadelphia, farmers' tin dairy ware, ... Diploma.

Scales.

MR. PRESIDENT: Your committee, having examined platform scales for hay and cattle, as well as scales for general purposes, of the Fairbanks, Howe, and Riehle Bro.'s patents, find, that while the different firms have some points of excellence above the others, yet the general workmanship and structure is so good, and the material differences so small, that without a prolonged and exhaustive mechanical test, it would be impossible to award a first premium to any one firm. But we would recommend a silver medal to the Howe Scale Company for their leather scales.

Yours, respectfully,
JOHN C. MORRIS, *Chairman*,
THOMAS G. JANVIER,
Committee.

GROUP XL—TRANSPORTATION.

WILLIAM S. BISSELL, Esquire, *President:*

The undersigned, committee on Group XL, transportation, respectfully report, that the collection or exhibit of wagons and other vehicles drawn by horses, on display, was creditable alike in numbers and workmanship. The variety was also large, and embraced all the classes and grades required for public and private use. Many of them also displayed a high degree of ingenuity in their appliances and fittings, and give evidence of great progress in this important branch of industry, necessity, and convenience. Great interest was manifested by many of the visitors to the exhibition in the examination of the construction of the several patented articles on display, which is a satisfactory assurance that public attention is directed in a large measure to the requirements of vehicles and carriages combining ease, lightness, and carrying capacity, as most essential in this vicinity, and your committee take this occasion to direct the attention of the manufacturers of our State to this fact. The report of awards will be found in the subjoined schedule of classification.

(Signed,) IRA TRIPP, *Chairman*,
W. W. BOYER.

A. B. Farquhar, York, Pennsylvania, wheelbarrow,	Diploma.
S. H. Henderson, Brandywine Summit, Pennsylvania, whiffletrees,	Diploma.
P. B. Cunningham, Allentown, Pennsylvania, patent corn wagon,	Diploma.
Erickson & Garrett, Philadelphia, spring business wagons,	Diploma.
Eberly Brothers, Mechanicsburg, Pennsylvania, column of spokes,	Bronze medal..
George W. Stricker, Philadelphia, carriages,	Diploma.
D. M. Lane & Sons, Philadelphia, carriages,	Bronze medal.
C. R. Millinger, Philadelphia, carriages,	Bronze medal.
I. P. Branin, Chester, Pennsylvania, buggy,	Diploma.
William D. Gardner, Philadelphia, carriages,	Silver medal.
Dexter Spring Company, Philadelphia, carriage parts,	Diploma.
A. Warner, Belvidere, New Jersey, carriage wheels,	Diploma.
Eastburn Reeder, New Hope, Pennsylvania, corn baskets,	Diploma.
B. F. Skeen, Lancaster, Pennsylvania, bent carriage rims,	Diploma.
H. C. Scott, Philadelphia, clip and plain full-fifth wheels,	Diploma.
W. & L. Wenkenbach, Philadelphia, platform delivery wagon,	Diploma.
J. V. Randall, Newtown, Bucks county, Pennsylvania, extension phaeton,	Diploma.
J. J. Criswell, Philadelphia, baby carriages and wagons,	Diploma.
John D. Brunner, Doylestown, Pennsylvania, falling-top buggy,	Diploma.
Rogers, Dean & Monteith, Philadelphia, shifting-top buggy,	Diploma.
W. H. Atkinson, Bucks county, Pennsylvania, hay wagon,	Diploma.
Edward Neal, Montgomery county, Pennsylvania, farm wagon and cart,	Diploma.

T. S. Watson, Philadelphia, Mosher patent bag-holder, ... Diploma.
Dewitt Nyce & Co., Belvidere, New Jersey, side-bar spring-frames, Diploma.
W. C. Barker & Co., Philadelphia, willow ware, crates, &c., . . Diploma.
Clement & Dunbar, Philadelphia, cedar ware, ... Silver medal.
J. D. Heritage, Bustleton, Pennsylvania, carriages, ... Diploma.
McLear & Kendall, Philadelphia, carriages, ... Bronze medal.
Edwin Hart, Philadelphia, light carriages, ... Silver medal.
S. Welden, Philadelphia, children's carriages, ... Diploma.
Fleckenstine & Miller, Highville, Bucks county, Pa., car coupling, Diploma.
Chambers Bros. & Co., Philadelphia, bolt and rivet clipper, . . . Diploma.
Phillips & Calvert, Philadelphia, silver mounted harness, . . . Diploma.
Same. Patent automatic check rein, ... Diploma.
Fulton & Walker, Philadelphia, wagons, ... Diploma.
Frederick Sidle, Mechanicsburg, Pennsylvania, spokes, hubs, and felloes, ... Silver medal.
Geo. Leugert & Son, Philadelphia, business and express wagons, Silver medal.

Supplementary Report.

Special committee on sub-class report, that George W. Wagner, of Roxborough, exhibited a light wagon of superior make, and, in the judgment of your committee, of great merit, particularly in the springs with which it is rigged. The material of which it is constructed we believe to be of the best quality, and we commend its light and safe movement as established on sound principles. Having arrived too late for competition, we regret we can only award it a Diploma.

(Signed) David Taggart, *Chairman*,
John C. Morris,
Elbridge McConkey,
Special Committee.

DEPARTMENT V.—Farm, Family, and Popular Improvement.

GROUP XLI.—Water Supply and Drainage.

George R. Moore, Philadelphia, water closets and ventilators, . . Diploma.
Gormley & Magee, automatic foul air valve, ... Diploma.
William H. McFadden, M. D., *Chairman.*

GROUP XLII—Fertilizers and Chemicals.

M. F. Wheeler, disinfectants and method of applying them, . Silver medal.
C. H. Lefevre, second best display, ... Bronze medal.
E. H. Miller, & Co., baking powder, ... Diploma.

Special mention is made of cattle powder, by Asa Jones and Malcolm & Stevenson; disinfectants, by E. F. Horner & Co.; salt for the preservation of vegetables, &c., by C. Fegenbush, Philadelphia; disinfectants, by W. R. Warner & Co., Philadelphia.

H. W. Jones, Philadelphia, asbestos paints, ... Diploma.
E. H. Miles, Philadelphia, self baking powder, ... Diploma.
French, Richards & Co., peerless colors for mortar, ... Diploma.

Main Building, Centennial Park,
Philadelphia, *September 15, 1879.*

To President and Members of Penna. State Agricultural Society:

Gentlemen: Your committee upon (Group XLII) fertilizers and chemicals, in making their report, would first call attention to the exhibits as a whole. While the display of fertilizers is fuller than on former occasions, it has not met our expectations, either in respect to fullness or variety. On account of the difficulty of otherwise determining their character and value, the committee recommend that samples of the fertilizers on exhibition be sent to the chemist for analysis. One deficiency we would specially direct attention to. For the past thirty years, efforts have been made solely toward supplying the soil with phosphoric acid and nitrogenous compounds, to the neglect of potash, which is an equally essential ingredient in plants, and equally deficient in soils. We also observe an entire absence of minerals from which fertilizers may be manufactured. The imperfect classification of the premium list prevents our considering some articles entered upon it. We have awarded as follows:

Best display of fertilizers, a silver medal is awarded to the Farmers' Cooperative Fertilizer Company of Philadelphia, and for a second best exhibit, to J. E. Tygert & Co., of Philadelphia, a bronze medal.

To M. F. Wheeler, for his patent process for imbuing plaster of paris with solutions of various disinfectants, and for the best collection of disinfectants, a silver medal.

For M. F. Wheeler's apparatus and process for applying the insecticidal dissinfectants to gardening and general agricultural purposes, a silver medal.

The second best display and variety of disinfectants, were those of C. H. LeFevre, of Philadelphia, to whom we award a bronze medal.

Messrs. M. L. Shoemaker & Co., of Philadelphia, exhibited a case containing specimens from their new method of extracting the fatty matters, all tallow and residuary animal matters from bones and other animal substances by benzine, thereby utilizing the animal oils, and improving the manufacturing fertilizers. (See Note 1, at the end of report.)

Mr. E. H. Miles & Co. showed a quantity of baking powder, testing it on the spot, for which we award the highest premium, being a diploma. (See Note 2, at end of report.)

E. F. Horne & Co., of Philadelphia, exhibited a disinfectant, consisting of chloride of zinc, in liquid form, said to be cheaper than usual; also, as a dry powder, made by imbuing a neutral substance with the liquid chloride.

C. Fegenbush, of Philadelphia, presented to our notice a salt, which he stated was capable of preserving vegetables, but only showed specimens of flesh preserved by it.

W. K. Warner & Co., of Philadelphia, combined the properties of copperas and crude carbolic acid for disinfecting purposes, thereby rendering it doubly useful.

Very respectfully,
W. H. G. ADNEY, *Chairman*,
HUGH HAMILTON,
JAMES C. BOOTH, *Committee*.

NOTE 1. By extracting the fats from cracklings by benzine, M. L. Shoemaker & Co. have formed what we believe to be a new and valuable fertilizer, which they term ammonite, consisting of the residue of cracklings after the removal of fat, ground to a fine powder, and which must therefore contain twelve to eighteen per cent. ammonia. For this new and valuable fertilizer, we recommend the award of a silver medal.

NOTE 2. Collections of paints are exhibited by Harrison, Brothers & Co., John Lucas & Co., and French, Richards & Co. Of these collections, that of John Lucas & Co. is the best collection prepared for the present exhibition, and we therefore award this firm a diploma. They all sustain their respective reputations in quality of display.

For the best collection of veterinary remedies, we recommend a bronze medal to Mr. Asa Jones.

Malcolm & Stevenson have likewise a highly creditable display of cattle powder.

NOTE 3. The exhibit of the Continental Guano Company is described by the exhibitor, as a mixture of the ordinary mineral fertilizers with pure horse manure, thoroughly steam dried, and ground to powder. This fertilizer being a dry powder, can be applied like others; and although horse manure in a mixed form has long been applied and is well known for its excellence, yet we must regard this as a new and valuable artificial fertilizer; but whether sufficiently new to warrant the award of a silver medal, we are in doubt, and therefore leave the decision to the general committee, believing, however, that some award should be made.

PRESIDENT'S OFFICE, *September 18, 1879.*

Upon the above report the Executive Committee delayed action until, at least, an analysis shall have been made by the Chemist of the Society.

W. H. G. ADNEY.

By resolution of the Executive Committee, the awards for all fertilizers were canceled, and no premiums are to be given until a sample is forwarded to the Secretary, which is to be analyzed by the Chemist, and upon his report the committee will take action.

GROUP XLIII—BUILDINGS, ENCLOSURES, AND ROADS.

Imperishable Stone Block Pavement Company, Norristown, Pennsylvania, artificial stones for paving streets,	Bronze medal.
C. H. Webster, Philadelphia, picture frames, bird houses, &c.,	Diploma.
Wilson Mitchell, Philadelphia, artificial stone plant basin,	Bronze medal.
Same. Tiles for dairy floors,	Diploma.
J. C. Bryan, Philadelphia, lightning rods, weather vanes, &c.,	Diploma.
Economy Works, Feasterville, Pennsylvania, fire escape ladder,	Diploma.
Peerless Brick Company, Philadelphia, plain, ornamented, and colored bricks,	Diploma.
Wiard & Pettit, Philadelphia, two-horse stalls and fixtures,	Silver medal.
H. H. & G. W. Allen, Philadelphia, steel barb fence, wire,	Bronze medal.
Empson Atkinson, Woodstown, New Jersey, road scraper,	Diploma.
Galloway & Graff, Philadelphia, terra-cotta work,	Silver medal.
D. Pettit, Philadelphia, wrought iron fences and gates,	Diploma.
Farrell & Co., Philadelphia, fire and and burglar proof safes,	Bronze medal.
Aaron Wissler, Brunerville, Pennsylvania, cellar grates,	Diploma.
Theodore Rue, Philadelphia, pew and door plates, and numbers,	Diploma.

W. S. BISSELL, Esquire,

President of the Pennsylvania State Agricultural Society:

SIR: Your committee have the honor to report in detail as follows:

The Imperishable Stone Block Pavement Company, Norristown, exhibit artificial stone for paving streets, a composition of asphalt material and sharp quartz in the form of blocks, which show high durability, and where used, we believe them to be for the purpose very good and durable, and award them a bronze medal, (1403.)

Wilson Mitchell, 310 York avenue, Philadelphia, exhibits an artificial stone plant basin, (1402,) artificial stone tombstone, (1402), and tiles for dairy floor, (1401), composed of Portland cement, gravel, and sand consolidated under pressure, the surface being finished with cement and fine sand of the same relative proportions as the interior, to prevent surface cracks from unequal expansion and contraction; for the first two we award a bronze medal, (1402,) and for the last a diploma, as we believe them to be very good and cheap.

Peerless Brick Company make a display of plain, ornamental, and colored bricks, which are very good, and in large variety, and for which we recommend the first premium, a diploma.

Wiard & Pettit, 441 North Broad street, Philadelphia, exhibit two horse stalls, and collection of fixtures, very good castings, and well made, showing novelty of design, utility and cheapness of construction, for which we award them a silver medal, the first premium.

W. H. & G. W. Allen, 113 Market street, Philadelphia, exhibit steel barb, fence wire, good, and very useful where timber for fencing is difficult to obtain, or where the lightest fencing is desirable, and for which we award the first premium, a bronze medal.

J. C. Bryan, 1231 Market street, Philadelphia, exhibits a lightning rod, weather vane, and cardinal points of the compass, of novel design and construction, and for which we recommend a diploma.

Economy Works, Feasterville, Pennsylvania, exhibit a fire escape ladder, which is constructed in sections, and seems worthy of mention, and a diploma.

David Pettit & Co., south-west corner Twelfth and Noble, Philadelphia, shows a display of wrought iron fences and gates, of excellent designs, and well made, for which we award a diploma.

Empson Atkinson, Woodstown, New Jersey, and Samuel Pennock, Kennett Square, Pennsylvania, exhibit road scrapers, to the former we award the premium, a diploma, for convenience, utility and simplicity; the latter being good and substantial.

C. H. Webster, 825 North Sixteenth street, exhibits a collection of rustic work, which is very good, and in large variety, and for which we award a diploma.

Galloway & Graff, Market street, above Seventeenth, Philadelphia, have a very good display of terra-cotta ware, embracing flower pots, stands, seats, vases, statues, &c., showing both original designs and reproductions of ancient vases, both plain and decorated, of which the designs and workmanship are admirable.

Farrell & Co., 631 Chestnut street, Philadelphia, make a good exhibit of fire and burglar proof safes, and jewel caskets, which show their latest improvements in seamless welded frames, franklinite and steel welded; rubber-packed door frames, which are very good, and deserve a first premium, the bronze medal.

Theodore Rue, Arch street, above Second, Philadelphia, substitutes his process of striking the numbers of pew plates, the letters of door plates, &c., by dies for the old and tedious process of engraving. The characters are sharp, exhibiting no depression of the edges, and the process is economical, and well worthy of your diploma.

Thomas Dyer, 327 Water street, Philadelphia, exhibits a machine for relevating bricks and mortar, which is good, but seems identical with those which have been in use for a number of years.

Aaron Wissler, of Brunerville, Pennsylvania, had on exhibition cellar gates, for which we award a diploma.

All of which is respectfully submitted.

WILLIAM C. BAYLEY, *Chairman.*
C. HENRY RONEY,
Committee.

PHILADELPHIA, *September 15, 1879.*

WILLIAM S. BISSELL, Esquire, *President, &c.:*

Your committee on Group XLIV, appointed to award premiums on "Education and Natural Science," respectfully reports, that most of the educational and scientific collections belonging to the permanent exhibition already in the building, were not entered as a portion of the exhibition of your Society, and therefore did not come into competition. Your jury, therefore, found comparatively little to examine under the above heads. The objects of natural history shown by Mrs. M. A. Maxwell, in the form of a tableaux, are in an excellent state of preservation, and well worthy of honorable mention, and the same distinction is accorded to the astronomical apparatus of Mr. Henry Whitall, of Camden, New Jersey, and to the instruments of veterinary surgery of Mr. G. P. Pilling, of Philadelphia. Among them is a small, straight silver catheter, designed to be introduced through the teat into a cow's udder and draw off the milk. In cases of inflamed teats or udder, the instrument promises to be useful.

To Messrs. W. H. Pile & Son, of Philadelphia, for their glass instruments for measuring the density of milk, bark liquor, spirits, and other liquids, the volume of cream produced from milk, and the temperature of liquids, hot and cold, your highest premium offered, a diploma, is awarded.

The engineering instruments of Messrs. Heller & Brightly, of Philadelphia, are very well made, and are furnished with several minor improvements, which serve to maintain their accuracy and facilitate observations. Among them may be mentioned agate bearings for the telescope, on the Y's of the leveling instrument; ball and socket bearings for the set screws of the head of the tripod; Hoffman's improved tripod head; rain and dust guards, and alidade with moveable edge. For their skill in the manufacture of engineering instruments, and their success in improving them, your jury awards Messrs. Heller & Brightly your highest premium, a bronze medal.

Messrs. Winneberger & Son's office and library furniture, especially their secretaries and office tables, are of the most approved pattern and workmanship, and the school desk of I. Newton Pierce, of Philadelphia, is of ingenious design. The school furniture of the Keystone School and Church Furniture Company, of Philadelphia, is well adapted to its purposes. The bottoms and backs of the seats are formed of slats of hard wood, fastened by dovetail and flange, which, partly imbedded, passes through the entire series. This fastens them together in the most compact and durable manner, and gives them the curve most easy to the sitter. The bottom of the seat is attached to the iron standards by dovetail hinges which admit of folding up, and the top has stop hinges of great ingenuity, by which it can be folded upwards to form a back rest, downwards and out of the way when the room is being cleaned, or stopped and held in the properly inclined position for writing. For these desks your jury awards your bronze medal.

Messrs. Rex & Bockius operate Fiester's rotary job printing press, of great stability and ease of motion, and nice adaptation of parts, qualities which entitle its maker to your diploma. And a similar distinction is well deserved by Messrs. Chambers Bros. & Co., of Philadelphia, for their Brown & Currier paper cutting machine, also in operation. In design and construction it is excellent, and the facility with which it may be managed, and the precision of its work, are admirable.

Two processes for copying letters are shown. In one of them, the papyrograph, the letter is written on prepared paper, with an alkaline ink, which renders the preparation soluble where it comes in contact with it, and permits of its partial removal when the paper is floated on water. The lines written being thus rendered porous, the paper is laid in a press, upon a velvet pad containing ink, and over it a blank sheet of paper. By pressure, the ink of the pad is forced through the porous characters to the surface of the blank sheet, and a duplicate produced. Several hundred impressions may be taken from the prepared paper without renewal. The Papyrograph is ingenious, useful, and well worthy of a diploma. Neither in the process shown by Mr. W. B. Zeiber, called by him the Multiplying Slate, nor in that shown by Ostheim Bros., in the Duplicator, is a press required. Indeed, the materials used, the process, and the results obtained, so nearly resemble each other that your jury is unable to discriminate between them. In both a shallow metal pan is used, which is filled to the depth of half an inch, or more, with a warm solution of a substance resembling glue. This, upon cooling, assumes a gelatinous consistence, and presents a surface smooth, and even, and firm enough to bear the weight of the hand. The original to be copied having been written on letter paper, with prepared ink, is now applied, face downward, to the slightly dampened gelatinous surface, and allowed to remain a few minutes, when sufficient of the ink will have been absorbed. The original is then removed, the paper which is to receive the copy applied, and gently rubbed with the finger. A *fac simile* of the original is thus obtained, and fifty copies, it is claimed, can, in this was, be printed before the ink is too much exhausted. What remains is then immediately sponged out. The process is simple, cheap, and quick, and as it is impossible to discriminate between the rival exhibitors, a diploma is awarded each.

Messrs. Fairbanks & Co., exhibit the newly improved type-writing machine, which prints with capitals and lower case letters. Two types of the same letter, and of each of the two forms, are attached to one lever, which is operated by its proper key. When a capital is to be printed, the paper is pushed towards it, and made to receive the impression by means of a key, which serves this purpose for all of the capitals. By the aid of manifold paper three or four impressions can be taken at the same time. For this improvement your jury awards Messrs. Fairbanks & Co., your bronze medal.

The following is a summary of the awards:

Mrs. M. A. Mawwell, Log Cabin, Main Exhibition Building, Philadelphia, taxidermy exhibit,	Honorable mention.
Mr. Henry Whitall, 502 South Third street, Camden, New Jersey, astronomical charts and apparatus,	Honorable mention.
G. P. Pilling, 111 South Tenth street, Philadelphia, veterinary surgery instruments,	Honorable mention.
Chambers Bros. & Co., Ffty-second street and Lancaster avenue, Philadelphia, paper cutting machinery,	Diploma.
W. H. Pile & Son, 768 Passayunk avenue, Philadelphia, hydrometers and specific gravity bottles,	Diploma.
Papyrograph Company, Philadelphia, Zucatto's papyrograph,	Diploma.
W. B. Zieber, Third and Walnut streets, Philadelphia, multiplying slate,	Diploma.
Ostheimer Brothers, 30 Bank street, Philadelphia, duplicator,	Diploma.
Ferree & Co., Tenth and Chestnut streets, Philadelphia, collection agricultural periodicals of the United States,	Diploma.
Heller & Brightly, 33 N. Seventh street, Philadelphia, case of engineering instruments,	Bronze medal.
Keystone Church and School Furniture Company, 518 Arch street, Philadelphia, Triumph folding desk,	Bronze medal

Fairbanks & Co., Chestnut street, Philadelphia, improved type writing machine, ... Bronze medal.

Respectfully submitted.

ALFRED L. KENNEDY,
JOSEPH LEIDY,
J. GIBBONS HUNT,
Committee.

The jury of awards appointed by the President to examine and report upon Department 5, Group XLV, under the head of fine arts, beg leave to submit the following:

The collection in this department, though small, presented many meritorious features, both in design and skilled workmanship. Many articles entered upon the books were not presented for examination, or if presented, were not found by us. Several articles presented were deemed not sufficiently meritorious to call for special mention. Our aim has been to elevate the standard in this department. Ingeniously wrought devices for combining novel materials as substitutes for that which is far more appropriate, can hardly be classed under the head or name of fine art. Neither should there be presented in an exhibition like this, articles that ordinary skilled hands can design or make.

It is doubtless the intention of this Society to stimulate the deserving to higher aims and greater exertions. Believing this, we have used as judiciously as possible the powers conferred upon us, in awarding prizes and making mention of deserving articles not properly coming within the range of awards.

We regret exceedingly that there was not a greater display of designs in marble, stone, bronze, pottery, &c., and for lawn and garden ornamentation, of which Philadelphia alone is so abundantly able to supply, saying nothing of what other parts of the State could do. It is true the amount in prizes was hardly sufficient to awaken much interest, but the opportunity for displaying these articles to the very best advantage cannot be excelled. The class of people before whom such an exhibit comes on an occasion like this, see their needs. Their needs soon become wants.

Our farmers and mechanics are beginning to see and realize, that to make home attractive and happy, and to induce the children that come after them to continue on the farm and in the workshop, they must do far more in the direction of cultivating a love for the beautiful. Then they will stay at and love home, because it is attractive. May we not urge, then, that in future exhibitions, greater efforts be put forth to obtain a larger and more complete display of all those articles that serve to awaken and cultivate the æsthetic nature of man.

To this end let us suggest that the jury of awards be appointed and notified at a much earlier date, that they may, to some extent, help to work up the exhibit in this special department. Very much could, and doubtless would, be done by them, through the public press.

Before closing this report, may we not ask, would it not be advisable for the chairmen of these various juries of awards to meet with the Executive Committee for consultation and advice? This meeting to be, say the first or second evening after the examinations begin. By thus meeting, many conflicting difficulties that must necessarily arise, could be readily and easily adjusted. Besides, the whole work would be far more harmoniously done, acquaintanceship extended, and a far better feeling enlisted for future work.

All of which is most respectfully submitted.

F. A. ALLEN,
GEORGE W. PETTIT,
WILLIAM B. BEMENT.

The following is a summary of the awards in Group XLV, fine arts.

GROUP XLV—FINE ARTS.

Levytype Company, Philadelphia, collection of specimens of relief printing, plates, &c., ... Diploma.
Mrs. Thomas Weaver, Philadelphia, wax boat, vase, and lyre, . . Diploma.
T. Leonhardt & Son, Philadelphia, frame of lithographic work, . Diploma.
Schreiber & Sons, Philadelphia, photographs of animals, . . Silver medal.
Same. Best collections of photographs from nature, . . Silver medal.
Mrs. E. S. Harris, Philadelphia, design of preserved natural flowers, &c., ... Honorable mention.
John Collins, Philadelphia, water color drawings, ... Bronze medal.
Hardy & Yarnall, cross of preserved natural flowers, ... Diploma.
Eliza H. Schofield, bouquet table, ... Diploma.
A. Williams, wax fruits, ... iploma.
Same. Entomological designs in leather, ... Diploma.
Charles Ferdinand & Brother, Phœnixville, Pennsylvania, panel altar railing, &c., ... Diploma.
T. J. Cole, 2204 Chestnut street, Philadelphia, crayon portrait, Favorable mention.
Adrienette LeFevre, Blackwoodstown, New Jersey, boy's bust, crayon, Diploma.
Miss Pauline Imlay, 312 Stock Exchange Place, Philadelphia, crayon portrait, Jersey cow, "Patty Mac.," possesses great merit, and worthy of . . . . . . Honorable mention.
George Sturges, 615 North Eighteenth street, Philadelphia, crayon portrait, "Goldsmith Maid," . . . . Honorable mention.

GROUP XLVI—MUSICAL INSTRUMENTS, &c.

George W. Boyd, Harrisburg, Pennsylvania, fishing tackle, Bronze medal.
John Albert, Philadelphia, collection of violins, ... Bronze medal.
C. F. Dunner, Quakertown, Pennsylvania, best church organ, Silver medal.
George A. Dearborn & Co., Philadelphia, best collection of musical instruments, ... Silver medal.
F. A. North & Co., Philadelphia, best family organ, ... Silver medal.
Conrad Meyer & Son, Philadelphia, best pianos, ... Silver medal.
H. W. Baltz, Philadelphia, velocipedes, ... Bronze medal.
Joseph C. Grubb & Co., Philadelphia, best fowling piece, . Bronze medal.
George W. Burgess, Norristown, Pennsylvania, fishing tackle, Honorable mention.
William Wurfflein, Philadelphia, fine arms, &c., ... Silver medal.
William Blasius, Philadelphia, mechanical orguinette, . . Silver medal.
E. Needham & Son, 809 Filbert street, Philadelphia, musical cabinets, ... Silver medal.

L. A. MACKEY, *Chairman.*

GROUP XLVII—ESSAYS AND REPORTS.

HARRISBURG, *December 18, 1879.*

To the President and Members of the Pennsylvania State Agriculture Society.

GENTLEMEN: Your jury of awards on Group XLVII, Essays and Reports, tenders its congratulations upon the increased interest manifested in the premiums offered in this group. While in every other group, excepting only that of Crops, the premiums for 1879 were increased, those for Essays and Reports remain unchanged, both in number and in the sums offered for each paper. The change was only in the topics, and on every one of these new themes, one or more essays have been written and presented. That these were not always up to the standard which your jury felt it to be its duty to prescribe, may be attributed either to a want of familiarity on the part of the writers with what is now being done on the subject they discuss, or to a failure to appreciate the importance of presenting it forcibly. For this reason a long paper on organizing and uniting State, county, and local societies in the next effective way for the advancement of agriculture, Premium list No. 1518; was unsuccessful, and one on agricultural colleges, P. L. No. 1522, failed to take the first place. One, although not reaching the standard of a prize paper, is so excellent, that arrangements were made with its author for its publication, and another, the production of an author who had already been awarded two of the prizes, was similarly arranged for. Both will appear in the present volume.

To the authors of the remaining three, your jury makes the following awards:

To Professor H. E. Stockbridge, Amherst, Massachusets, for his essay on "The Causes of Failure of Crops and in Farming," a silver cup or thirty dollars, at his option.

To Mr. C. A. Schneebeli, Easton, Pennsylvania, for his essay on "Securing the Least Suffering to Animals while they are being Transported or Slaughtered," a silver cup or twenty-five dollars, at his option.

To Professor H. E. Stockbridge, for his essay on "The Most Effective Methods of Instructing Students of Agricultural Colleges, so that they may be both induced and prepared to pursue the practice of their calling after they graduate," a silver cup or twenty-five dollars, at his option.

The reports on the exhibition published in the leading Philadelphia dailies were excellent, both in spirit and description. Those which appeared in two of them—the *Philadelphia Record* and the *Public Ledger*—were especially noteworthy, and were placed in competition for your prize "for the best report on the exhibition published in a newspaper." Neither of these reports is sufficiently complete to admit of its publication in your volume of transactions, without supplementary notes by officers of the exhibition, but both indicate great diligence in the collection of facts and fidelity in expressing them. Both will be found valuable in making up the report for the volume on one or more of the five departments of the exhibition, and also the minutes of the meetings held during its continuance.

The report of the *Philadelphia Record*, however, is much the fuller of the two, and your jury awards it your prize of twenty dollars.

The report of the *Public Ledger* is so excellent in its treatment of the matter in hand, that your jury deems it worthy of a special premium of fifteen dollars, and accordingly makes that award to Mr. Charles S. Spangler, upon whom the duty devolved of reporting the exhibition for that paper.

Respectfully submitted,

ALFRED L. KENNEDY, *Chairman*,
ELBRIDGE MCCONKEY,
JOHN C. MORRIS,
D. W. SEILER,
Jury of Awards.

GROUP XLIX.

WILLIAM S. BISSELL, Esquire, *President, &c :*

Your committee on Group XLIX have examined the several exhibits arranged in their class, and make the following report:

Robert Taylor & Co., Philadelphia, black lead crucibles, &c.,	Bronze medal.
Otto Kaehler, 63 North Eighth street, Philadelphia, swan powder puffs, &c.,	Diploma.
Alexander Krumbaahr, 1601 Spring Garden street Philadelphia, horse tooth rasp,	Diploma.
E. N. Banks, Wilkes-Barre, Pennsylvania, improved trace fastener,	Diploma.
C. M. O'Hara, Philadelphia, tenexine,	Diploma.
Edis, Mockridge & Co., Philadelphia, celluloid collars and cuffs,	Diploma.
B. Levy, New York, Nevada silican polishing powder,	Diploma.
Horace B. Long, Philadelphia, blueing, inks, &c.,	Diploma.
Charles Ritchie, Philadelphia, sugar coated peanuts,	Diploma.
P. O. Atwood, Philadelphia, vapor oil stove,	Diploma.
S. S. Applegate, Philadelphia, Applegates electric floor alarm,	Diploma.
J. & E. M. Hall, Philadelphia, cross made of large variety of seeds,	Diploma.
Amelia Taft, Philadelphia, bread cutter,	Diploma.
Toilet Shoe Dressing Company, Philadelphia, ladies' toilet shoe dressing,	Diploma.
C. Maus, Danville, Pennsylvania, device for oiling wagon wheels,	Diploma.
J. Cheston Morris, Philadelphia, method for transporting milk,	Diploma.
Gillam & Co., Philadelphia, printing on spherical bodies,	Diploma.
William B. Burk, Philadelphia, display of corks,	Diploma.
H. P. Travers & Son, New York, swinging hammock,	Diploma.

The committee would make *special mention* of the following exhibitors of shoe polish, and leather dressing:

Toilet Shoe Company, Philadelphia.
Wolf & Randolph, Philadelphia.
Horace B. Long, Philadelphia.
B. B. Oil Blacking Company, Philadelphia.

Neither of these is really in competition with the other—each professing qualities commendable in itself; and so no especial award is recommended.

WILLIAM H. EGLE,
R. E. MONEGHAN,
W. H. GRIER,
L. ROGERS,
Committee.

CORRECTIONS AND ADDITIONS.

The reader will please make the following changes in the preceding list of awards:

Page 24. Between fourth and fifth lines, insert "DEPARTMENT I—LIVE STOCK. Transfer thirty-fourth to thirty-seventh lines, inclusive, to Class 2.

Page 25. Twelfth line, for " H. N. Smith, Trenton, N. J.," read " Charles Lafferty, West Philadelphia."

Page 27. First line, after " gelding," insert " Lounger." Fifth line, before " Clip," insert " stallion." Seventeenth line, before " cattle," insert " GROUP II." Forty-second line, for " and," read " or."

Page 28. Twenty-fourth line, after " but," insert " must be ;" and after " descended," insert " on both sides."

Page 29. Thirty-first line, strike out " Holstein."

Page 30. Sixth line, for " same," read " T. S. Cooper." Eighth line, for " same," read " Louis Jack." Tenth line, for " heifer," read cow." Eleventh line, for " second premium," read " first premium."

Page 34. Twenty-fifth line, before " swine," insert " GROUP IV."

Page 40. Third line, after " silk," insert " Silver medal." Between fifth and sixth lines, insert " DEPARTMENT II—Forest, Farm, and Garden Products and their Derivatives." Seventh line, for " Biddle," read " Bissell." Fifteenth line, for " B. F.," read " F. B." Nineteenth line, for " Curven," read " Curwin."

Page 41. Thirty-fourth line, for " McNelty," read " McVitty."

Page 42. Tenth line, after " John McDowell, *Chairman*," add " C. Henry Roney, *Committee*."

Page 44. Thirty-third, thirty-fourth, thirty-fifth, thirty-sixth, and thirty-seventh lines to be transferred to page 25, after thirty-sixth line, and read as follows :

" Mr. E. Lafrance shows specimens of the American jute and ramie, which he has successfully prepared for manufacture.

" They recommend that the exhibit received honorable mention.

" JOHN MCDOWELL, *Chairman*.
" C. HENRY RONEY,
Committee.

" *September 17, 1879*."

Page 46. Forty-third line, for " James Dixon, New Jersey," read " Joseph Dixon Crucible Company, Jersey City, New Jersey."

Page 56. Between ninth and tenth line insert " DEPARTMENT III.—Apparel and Household Goods." Sixteenth line, for " Martin," read " Masten." Thirty-fifth line, for " E. Bardencaisher," read " E. Bardenwiper."

Page 57. Fourteenth line, for " Sozuisky," read " Sozinsky." Forty-sixth line, for " Losch," read " Lash." Fifty-first line, for " Bayer," read " Boyer."

Page 58. Tenth line, for " Coarad," read " Conradt."

Page 59. Thirty-fifth line, for "A. W. Peterson," read "A. H. Peterson."

Page 60. Sixteenth line, for " Nunzio," read " Nutrizio." Forty-first line, after " William," insert " P."

Page 61. Sixth line, for " L. M. Maine," read " M. L. Maine." Eighth line, for " extractor," read " excavator." Thirteenth line, for " Prune," read " Prince." Thirty-first line, for " 806 Carlisle street," read " 1608 Ridge avenue." Thirty-fifth line, for " Walter," read " Walton." Thirty-ninth line, after " Boiler," insert " and." Forty-fifth line, for " Nicols Shepherd & Co.," read " Nichols Shepard & Co."

Page 62. First line, for " 20," read " 20th street." Twenty-seventh line, for " Erwein," read " Ervein." Thirty-fourth line, for " Kespar," read " Keiper." Forty-sixth line, for " Hogan," read " Logan."

Page 63. Twenty-sixth line, for " Honorable mention," read " Diploma." Thirty-first line, for " Hoffman," read " Huffman." Thirty-second line, for " New Jersey," read " New York."

EXHIBITION AT PHILADELPHIA, 1879.

OPENING EXERCISES.

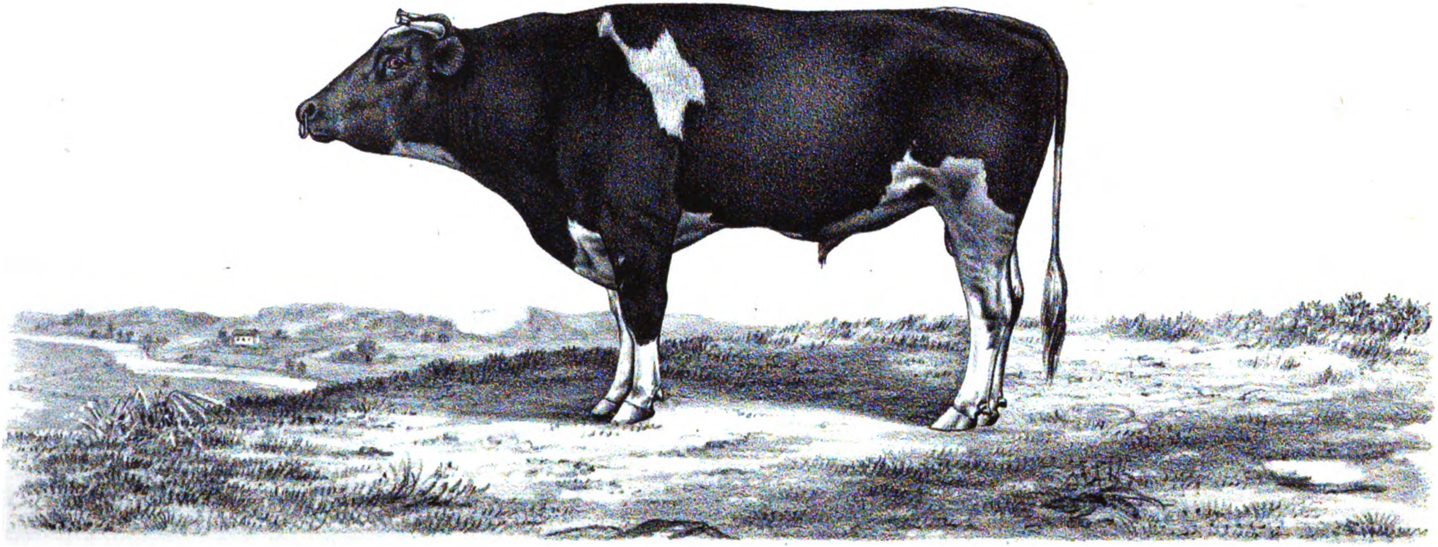
TUESDAY, SEPTEMBER 9.

The formal opening of the twenty-sixth annual Exhibition of the Pennsylvania State Agricultural Society took place, at noon, on Tuesday, September 9, in the Auditorium of the Main Centennial Building. An attractive programme, consisting of addresses and vocal and instrumental music, had been arranged, and, as the time approached, a large audience filled the spacious arena. The officers of the State Society, and of the Permanent Exhibition Company, as well as of the Board of Trade, and other organizations which had been invited to participate, assembled in the office of President Bissell, over the main entrance, and marched thence, to the music of Hassler's band, across the great building to the stage.

After the performance of an organ recital, on the Roosevelt grand organ, by Professor Mills, President Bissell rose and delivered the following:

PRESIDENT'S ADDRESS.

LADIES AND GENTLEMEN: We greet you here to-day at the inauguration of the twenty-sixth annual exhibition of the Pennsylvania State Agricultural Society. A generation in our progressive country has almost passed away; and I am reminded of the deaths of two of our own number, who have, within a brief period, gone from among us—John W. Hammond, my immediate predecessor, of Erie county, and John A. Smull, of Harrisburg, both of respected memory. They rest from their labors. It is now about twenty-two years since our last exhibition in the city of Philadelphia. During this interval our exhibition has been welcomed in all the larger and most important cities and towns of the State, and, by some, their hospitality has been again and again extended. Often, during this period, have we turned toward Philadelphia, hoping that circumstances would again favor the holding of a fair here; but the broad and grassy fields we had formerly occupied as a fair ground, and which then bore the name of one of your eminent agriculturists, John Hare Powel, have been converted into building lots, and become the site of great industries. For years your city was without a place adapted to our purposes. But the sentiment which inspired the holding of the Centennial Exhibition moved among the people. A place was then found for the national festival; this spacious building, the most appropriate and magnificent of all the centennial structures, was planned, and millions of visitors attested its unsurpassed adaptednees to exhibition purposes. During the past winter and spring, Pittsburgh, my native city, was warmly urged upon the Society as the place for this year's exhibition; but the tempting opportunity for a display amidst these magnificent surroundings was too great to be resisted, and an exhibition by the Pennsylvania State Society, near the forks of the Ohio, was, consequently, deferred to a future and more convenient season.



Holstein Bull, 1 Year

"AURORA"

Owned by Wm. M. Singerly, Gwynedd, Pa.

FIRST PRIZE PENNSYLVANIA STATE FAIR, PHILADELPHIA 1879.

The promoters of the exhibition of 1876, the most distinguished of whom we have here in your townsman, Mr. Welsh, were wise men, who labored long and arduously to give success to the centennial exhibition. Their labors were abundantly blessed in the glorious triumphs of the memorable year. But their work was not to end with 1876. It lives here to-day. They labored for a centennial exhibition, and, in so doing, they provided a place for a century of exhibitions right here. Each year adding its link to bind together 1876 and 1976 in one unbroken series along the extended line. And the Pennsylvania State Agricultural Society brings you to-day its first contribution towards maintaining the century of exhibitions. We place side by side, with the greatest triumphs of your manufacturing industries, the sources of these industries—the products of the soil. The fiber to spin which your bobbins wind—to weave which your shuttles fly. The cane and the root from which are expressed the saccharine juice you refine and crystalize; the seeds from which you squeeze and distill fixed and volatile oils; the prolific grain, the sustenance of England's toiling millions; the sheep and the swine, the cow, the mother of the dairy, and the ox and the horse, our patient servitors. In selecting for exhibition the choicest breeds of stock and farm products, our Society has had a large and long experience. And in improving these breeds and products, a wide and salutary influence. Since its organization, in 1851, it has omitted but two exhibitions—that of 1863, when the State was invaded by the enemies of the Union, and 1876, when the Society lent its influence and its efforts in favor of the centennial, and sent an offering of $1000 to be added to the medals and diplomas awarded exhibitors in the department of agriculture. Our Society neither issues shares of stock, declares dividends, nor seeks to accumulate property. Its premiums and other disbursements for the promotion of agriculture, exclusive of the cost of holding its exhibitions, have amounted to nearly $200,000, $13,000 of which were sent in aid of the State Agricultural College. Invaluable as are its exhibitions as a means of agricultural progress, our Society does not confind itself to holding them alone. By its committees, it goes out among the farms, inspects crops, and gives liberal cash premiums for those of superior quality. It offers prizes for the best essays on the social as well as professional improvement of the rural population, on the adornment of homes, on improvements in labor-saving machinery, and on the formation of coöperative associations. In this persistant, unostentatious and effective way, the Pennsylvania State Agricultural Society seeks to accomplish the objects of its organization. With lofty aims, a comprehensive scope, and an honorable record, it greets you to-day. With a hearty good will it invites you to give ear to its distinguished guests who will address you, and then to examine under the inspiration of their eloquent appeals—the multiplied witnesses of agricultural progress, which crowd this grand building and grounds.

At the conclusion of Mr. Bissell's remarks, a chorus, "Speed the Plow," a granger song, was sung by Ford & Zimmerman's chorus of fifty voices, and a waltz was played by the orchestra, after which the following telegram from Governor Hoyt was read:

GOVERNOR HOYT'S DISPATCH.

The National Guard inspection at Bloomsburg, Erie, and Pittsburgh will prevent my being with you this week. Next week I will try and fulfill any engagements you may form.

HENRY M. HOYT,
Governor of Pennsylvania.

Hon. John Welsh, late United States minister to Great Britain, was then introduced by the President, and when the applause with which he was greeted had somewhat subsided, he said:

ADDRESS OF HON. JOHN WELSH.

MR. PRESIDENT, LADIES AND GENTLEMEN: It gives me no little pleasure to be greeted once more on my native soil by my fellow countrymen. Whilst I have been absent I have been accustomed to receive many salutations; but they were to the representative, and not to the man. They were to me, but in behalf of a great country, by the people of a friendly nation, a people with whom we are all now on terms of the closest friendship, and by whom we are most highly esteemed. A change has come over that people within a few years that rejoices us all to know, and the more we look back the more we see the cause which gave them increased respect, and an inlarged interest in us. It was only three years ago when the representatives from England became familiar with us. They were sent out by their Government as experts in the industries, in the sciences, and the fine arts, as well as literature. They came here and dwelt among us, studied us and our institutions, examined our methods, passed through our country, and returned home and gave an account of what they had seen, and from that moment onward the United States has stood in a different light, eclipsing, as I think, all other nations, and placing its people on the closest terms of amity and friendship with those of that cold and enlightened land.

They have taken in us a great interest, and not the less because our agriculturists are the producers of their food and the providers of their dinner. Thirty years ago England had the capacity to feed three fourths of her people, but to-day hardly more than one third. Increase of population and diminished production have brought about the result, which to them is sad. Whilst we cannot be without sympathy for them, still it is pleasant for us to know that we can provide for their necessities. The agricultural interests of Great Britain are undergoing a great revolution—a revolution produced by natural causes—a revolution which is as mysterious to them as it is interesting to us. For twelve consecutive years their crops have failed, and, as an authority says, they have been decreasing on the average thirteen per cent. This has materially increased their wants, and made them more dependent upon us; and our competition is being felt throughout their land. England was famous for its cheese, but now ours has supplanted it; and, strange people that we are, we require that that which we produce shall go to England and come back to us to be fit for our use. They no longer provide, because we send it to them in such profuse abundance. So I might go on, and mention article after article, including their cereals, which can no longer be raised with profit. This, at first sight, would seem to be a matter of serious importance, but it is merely a change—a change which, whilst it is being undergone, is harmful. But when they adapt themselves to their new circumstances, they will find their prosperity as great as it ever was. You are aware that the land in England is held by the few. About four hundred and twenty individuals own more than one fourth of the land of Great Britain and Ireland, and ten thousand and eight hundred own more than one half, and this is out of a population of thirty-six million, which gives you the proportion of those interested in the soil and those dependent upon it. These are matters of interest to all of us, and will explain that great revolution they are passing through. How natural it is, that they should set the best intellects of the land at work to try to find out a remedy. It is this change which has to be undergone.

Ladies and gentlemen, I might prolong a discussion upon this subject—

it is one of interest—but I will only add this, that there is one hope which the English agriculturist has, and it is one which we should lay closely to heart. It is this, that we are striving to produce so much for their consumption that we are careless in our methods of production, and are rapidly exhausting the soil with which we have been so bountifully provided. Is this true? It seems to me that it is not. I cannot persuade myself that Americans are willing to kill the goose which lays the golden egg. I cannot persuade myself that our farmers—men of sense—are so little aware of that which interests them and their children, and I take it that we are surrounded by proof to the contrary in the fertile valleys which, for the last two hundred years, have been yielding bountiful crops and increasing in their production under improved treatment and greater science. I, therefore, feel no concern, but congratulate you upon the possessions we all now hold, and I believe that, if we are true to ourselves, true to our institutions, and steady in the policy we are now pursuing, in ten years all the world will acknowledge us as the leading nation.

Following was a very pleasing selection from Flutow's Opera of "Martha," when Hon. Wayne McVeagh was introduced.

REMARKS OF HON. WAYNE McVEAGH.

LADIES AND GENTLEMEN: I am very sure that after the two very interesting addresses to which you have already listened, with so much interest and advantage, and the music which you have heard, that I shall most gratify you, and best recognize the proprieties of the occasion, by confining myself to simply saying that while Pennsylvania justly and often boasts of the extent and value of her mineral resources, the skill of her artisans, the enterprise of her merchants, and of her populous cities and towns, which are centers of her varied manufacturing industries, yet we all recognize the truth that, after all, her chief possessions are her fertile fields of sweet blossoms of clover, her golden fields of ripened grain, and the cattle on her thousand hills; and, therefore, I have only to express to you the earnest hopes of the officers of the Society under whose auspices this exhibition has organized, that you will find in it an adequate display of the agricultural interest of Pennsylvania, and to bid you a hearty welcome to the opportunities they believe it affords for instruction and enjoyment.

After vocal music by the chorus, and instrumental music by Hassler's orchestra, the ceremonies of the day were concluded, and the visitors descending from the stage, proceeded under the lead of the President to inspect the exhibition.

CATTLE BREEDERS' MEETING.

THURSDAY, SEPTEMBER 11.

A meeting of members and others interested in the breeding of cattle was held at the room of the Philadelphia Society for Promoting Agriculture, South Third street, on Thursday evening, September 11. Vice President Blight occupied the chair, and called the meeting to order. He stated that there were few more important agricultural questions than the one which had brought them together—"the relative value of the breeds of cattle"—few upon which there was a greater diversity of opinion. Opinions generally turned upon the object for which we bred cattle, whether for beef or for milk. In this part of the country we bred for dairy purposes, and for such purposes, he was in favor of the Guernseys over either Short-Horns or Devons. Indeed, he preferred them also to the Jerseys, for while their milk was as rich and as abundant as that of the latter, the Guernseys were more robust, bearing the exposure and forage of our climate as well as ordinary cows, and taking good care of themselves. For butter especially, no breed equaled the Guernseys, and this fact was beginning to be acknowledged both in England and America. Those at the exhibition were very fair samples of the breed, and he regretted that there were not more of them.

The suggestion was made that an equal number of Guernseys and Jerseys at the exhibition be milked, and their cream made into butter in order to see which would yield the richer in color or quality, but the suggestion was not pressed.

Colonel David Taggart, of Northumberland, earnestly upheld the Jerseys. He said: I have been an owner of Jersey cattle since 1863, and for the last six years I have given them close personal attention. In appearance, in disposition, in the surpassing quality of their milk, and in generative precocity they commend themselves so strongly to me that I would not accept any other sort as a gift, on the condition of keeping them. I have some facts in regard to their early prolificness that may be interesting, and with your indulgence I will state them from memory. I have the dates recorded at home, and the elderly spinsters and widows thereabout accuse me of a malicious tenacity of recollection in respect to ages.

I have at present nine *milking cows and calves*, mostly of the last, as you will see by their ages. "Ruby," dropped March 2, 1872, had her first calf June 3, 1873; her second, May 15, 1874; third, March 29, 1875; fourth, February 1, 1876, ("Bessie;") fifth, January 2, 1877; sixth, November 12, 1877, ("Mary;") seventh, October 5, 1878; eighth, August 27, 1879. You will perceive that she was only seven years five months and twenty-five days old at that time. At this rate, by the time she has had another calf and a half, she will have gained a whole year.

"Nelly," dropped April 7, 1873, had her first, June 10, 1874; second, June 27, 1875; third, July 9, 1876, ("Annie;") fourth, June 27, 1877; fifth, April 27, 1878; sixth, March 31, 1879—six calves before she was six years old.

"Bessie," February 1, 1876; first calf July 8, 1877, ("Sally;") second, May 7, 1878; third, March 4, 1879—three heifer calves in nineteen months and twenty-six days.

"Fanny," July 2, 1876; first, March 28, 1878; second, May 20, 1879. This animal, *bred in and in*, having three fourths of the blood of her sire, has not done so well.

"Annie," July 9, 1876; dropped "Susie" December 25, 1877; "Julia," October 25, 1878; "Ida," October 5, 1879—three heifers again.

"Jennie," January 18, 1877; aborted at seven months, September 23, 1878; second calf, August 8, 1879.

"Sally," July 8, 1877; calved February 16, 1879. This made Bessie a grandmother at three years and fifteen days.

"Mary," November 12, 1877; calved May 11, 1879.

"Susie," December 25, 1877; calved May 22, 1879, one month and eighteen days before *her mother* was three years old.

"Hannah," out of imported "Antic," became a mother at fourteen months and twenty days, and her half sister, "Lillie," at fourteen months and twenty-three days. These two have passed into other hands.

To recapitulate:

Nelly was a mother at	14	months and	3	days.
Hannah	"	14	"	20 "
Lillie	"	14	"	23 "
Ruby	"	15	"	1 "
Susie	"	16	"	27 "
Bessie	"	17	"	7 "
Annie	"	17	"	16 "
Mary	"	17	"	29 "
Sally	"	19	"	8 "
Fanny	"	20	"	26 "

Jennie had had a calf and seven-ninths when she was two years six months and twenty days old. These are the performances of *the whole herd*, and not of picked animals.

If any constitutional grumbler asserts that this early and rapid breeding is hurtful, let him come and see for himself. Hon. John B. Packer, the present owner of Hannah thought she was too big. If any one has finer three-year olds than Bessie and Annie, or a better grown two-and-a-half-year old than Jennie, I will go far to see them.

It is logical to believe that the sooner a cow or a woman, or anybody else, can acquire a good habit, the better it will be for her; and surely it is a good habit for cows to drop valuable calves and give milk. If I can render mine not only self-supporting but profitable at fifteen to eighteen months, by keeping the right breed and feeding liberally, I am more fortunate than he who produces the same result by keeping the wrong kind, and half feeding, in thirty or thirty-six months. The half feeding for the longer period will cost much more, both in money and labor, than the full feeding for the shorter time, and produce animals of less symmetry and vigor. As a rule, the finest physical specimens of dogs, hogs, sheep, cattle, horses, jackasses and men are those that have never felt the pinchings of poverty.

I once made twenty-one ounces of butter from a measured quart of Jersey cream, and many times in small quantities at nearly this rate. The first result was produced by a dozen strokes of an egg-beater. Once a whole churning was made in two minutes in *December*. Four or five minutes are generally long enough with the right temperature.

If it be claimed that some other breeds will yield *more* milk, I will answer: that an addition of water, merely enough *to equalize the quality*, will set the Jerseys ahead, even in quantity.

Our great country owes much to the little island in the British channel, and, as our dairymen grow wiser, the debt will be increased.

Mr. Thomas T. Tasker, senior, of this city, who has a fine herd of Ayrshires at his farm in Delaware county, recommended the breed for the quantity and quality of milk the cows yielded. He claimed that there is a merited value in the breed that deserves careful attention by breeders.

It may be well, he said, to consider them in their special adaptation to dairy purposes, seeing they are free milkers, the quality of the milk of remarkable adaptation to the health of man, from babies to old age. It has been said their milk is especially adapted to cheese, and a long-experienced herd raiser of these cattle told me he had found them to be excellent for butter, only that the butter, under the churning operation, was a few minutes longer in gathering. For milk, they have no superior, and take as distinct a rank among breeds as do the Durhams for beef, or Alderneys for butter. Indeed, they complete the triangle of luxury, beef, milk, and butter. In size and weight, they are medium. A well selected herd will average nearly one thousand pounds each. In appearance, they are neat, refined, and handsome. Many of the cows have a grace about them amounting to dignity of mien. Nearly all their leading points are carried out to subdued sharpness.

They very much resemble in appearance the well got up milking Short-Horns. For there is a class of this ancestral breed that can't be beat for milk or butter. The Ayrshires are that breed in medium. They make as good veal or beef, and are as welcome at the shambles and the table, which cannot be said of some of our amateur breeds to the same extent. While some in this respect are not desirable. In color they are mostly red and white, sometimes mottled, and always attractive, when at pasture, for their picturesque aspect. For the most part, they have a large lustrous eye, broad betweeen the horns, neat muscle, fine neck, broad chest, rather sharp at shoulder, straight back, deep flank, broad across the hips, bag reaching well forward, and as well spread behind, and apt to milk down well; milk veins large, some very; whip like tail, bushy at the end; skin soft, easy, and of yellow cast; milk mirror well defined. They are easily disciplined, and, because of their intelligence, are docile and kind. A careful test by weight and measure for three years, has confirmed me in the opinion that they are the cattle to pay well for what they eat and the care they need. The average yield of eleven cows for the year, is twenty-seven hundred and sixty-one quarts, or fifty-nine hundred and thirty-eight pounds, and weight of each, on an average, nine hundred and seventy-two pounds. It appears to me, on deliberation, that, in these three breeds mentioned, we have all we need for beauty and utility. Then would it not be better to locate our purpose to perfect these rather than be ranging the world over for new names and sub-divisions which tend more to distraction than enjoyment.

Mr. David H. Branson, of Chester county, earnestly advocated the claim of the Short-Horns. They were, he said, the noblest of all the breeds, adapting themselves to all the vicissitudes of our climate, North and South. They led the van in England, whence all our finest breeds come, and carried off the prizes on the continent of Europe. A cow, like anything else, was worth just what it would bring, and, by this test, the Short-Horns stood unrivaled. A Short-Horn heifer raised in Canada had recently sold for £1,000 sterling. When heifers of other breeds sold as well, it would be time enough to talk about their being equal. Short-Horn bulls were doing more to improve the cattle of this country than all other breeds put together, and every year the average weight of western steers increased, because of the infusion of Short-Horn blood. That this breed was the best for beef nobody disputed. It was equally good for milk, and the farmer had his choice of breeding for beef or milk, just as he chose. There were strains of Short-Horns bred for milk, the cows of which surpassed, in their daily yield, Ayrshires, Jerseys, or Guernseys, and, when dry, they soon fattened for the butcher, taking on flesh rapidly.

Further remarks were made by the Chair and other gentlemen present, and the meeting adjourned at a late hour; the hope being expressed that opportunity would be found to discuss the subject again before the fair closed.

THE WOOL GROWERS' MEETING.

FRIDAY, SEPTEMBER, 12.

A meeting of members, and others interested in wool growing, was held in parlor C, Continental Hotel, Friday evening, September 12, agreeably to the following resolution, passed at the annual meeting of the State Society, held in January preceeding.

Resolved, That Mr. John McDowell, Vice President from the Twenty-fourth district, be authorized to correspond with the wool growers and sheep breeders of the United States, with the view of securing an exhibition of sheep from every State in the Union at our next annual exhibition.

Vice President McDOWELL called the meeting to order, and nominated for chairman Vice President George Rhey; which nomination was unanimously approved.

Mr. RHEY stated that the object of the meeting was to consider the propriety of holding a national sheep show in this country next fall. He called attention to the importance of sheep raising as one of our national industries, and its bearing upon the imports and exports of the country. For the five years prior to July 1, 1878, the value of woolen goods imported by the United States was $217,353,097. For the different years it ranged as follows: In 1874, $58,033,498; in 1875, $58,680,843; 1876, $41,456,425; 1877, $32,589,666; 1878, $33,592,569. Great Britian, in 1867, owned and fed 35,617,812 sheep, while the United States, in 1870, owned only 28,478,951 sheep. Now, when we consider the vastness of our territory, the established reputation we have, we see that something must be wrong. Our great western plains ought to be utilized at once in this great industry. The attention of the people should be called to the facilities we have for extending the production of sheep and wool.

Mr. JOHN McDOWELL, of Washington county, Pennsylvania, thought we ought to pay more attention to this important industry, from the fact that we carried the argument on our backs. He did not understand the meeting to be called to discuss the merits of the different breeds, but to consider the propriety of a national sheep show—a show that would bring the breeders of every variety together. About seventy-five prominent sheep raisers had been heard from, and all favored a national exhibition. At that time it was intended to have the show this fall, but the time was too short. We must have a longer time for preparation. Pennsylvania, being a central State, he thought that it would be the proper one in which to hold the exhibition, and favored Philadelphia as the point. The exhibit at the Centennial was not as satisfactory as could have been desired, and hence the importance of having a new one. What was wanted was to have the wool growers, the mutton raisers, and all interested in sheep farming, to come together for a comparison of views, to consider how to make the wool finer, the meat healthier, and lands more productive. When he first commenced in the sheep business, the manures were all hauled on the low meadow lands, but now it is the uplands, and they are the richest we have. We now raise thirty bushels of wheat to the acre, while formerly we raised but thirteen. He believed that in five years, land could be made almost fifty per cent. better by keeping sheep on it.

Mr. **MILLER**, of Washington county, was strongly in favor of such an exhibition. He enlightened some in the room in regard to the commercial value of fine wool and finely bred sheep.

Mr. **RHEY** thought we had everything in our favor to produce wool enough to supply the whole world.

W. L. **ARCHER**, of Washington county, said it was a fact that sheep have receded from the hills of New England, which was formerly the nursery of sheep breeding; and it is so in some parts of our own great State. Sheep are not so numerous in the hilly or mountainous regions. The same is the case in portions of New York. One reason was, sheep husbandry did not have the protection by legislation that it should. If the same protection was given to sheep that is given to cattle and horses, the increase in this State alone in five or six years would amount to 3,000,000 or 4,000,000 sheep, affording a cheaper and more nutritious article of food, to say nothing of the value of the wool in cash for the farmer. He thought that dogs should be declared a public nuisance by law, and should be summarily disposed of when found off their master's premises. He favored the proposed show, and believed that sheep breeders throughout the country would be glad of the opportunity to meet in a grand competitive show.

Mr. **ARCHER** advocated holding a national sheep show in the Centennial building, and spreading out the prizes as to cover every variety of sheep. This would interest all the breeders. He thought a year's time should be devoted to preparing for the exhibition.

Mr. **JOHN C. MORRIS**, of Susquehanna county, remarked on the superiority of the wool, exhibited at the present State fair, over that raised thirty or forty years ago.

Dr. **ALFRED L. KENNEDY** said that on the plains sheep husbandry was probably to be supplanted by cattle raising. There were thousands of acres of hilly country in this and the States south of Pennsylvania not adapted to tillage or the raising of cattle, but capable of supporting vast flocks of sheep, with markets close at hand, both for the wool and the carcase. He called attention to the improvements in wool-working machinery, and invited those who wished to see it in its greatest perfection to inspect the mills of Philadelphia, one of the great wool markets of the world.

Mr. **DAVID H. BRANSON** thought that every farmer would be benefited by keeping a few sheep. Many were doing so in his county, (Chester,) and were the practice extended, as it should be, the aggregate would swell the number of sheep in the State to double what it is, and a step be made towards producing all the wool the country needed. He thought the proposed national exhibition of sheep would be fruitful of one thing, at least, to encourage a protection to this great interest. If sheep raising could be entered into more generally we could furnish the wool for the world and send the carcase to London.

On motion of Mr. **McDOWELL**, a committee of three was appointed to confer with the different State societies on devising the best means for holding á national sheep show. The President appointed John McDowell, of Washington county; D. H. Branson, of Chester county; and John C. Morris, of Susquehanna county, as that committee.

On motion of Dr. A. L. **KENNEDY**, the chairman of the meeting, Mr. Rhey, was added to that committee. Adjourned.

THE FORESTRY MEETING.

THURSDAY, SEPTEMBER 18.

LETTER OF EX-GOVERNOR HARTRANFT AND OTHERS.

PHILADELPHIA, *August 16, 1879.*

To the Committee of Arrangement of the Exhibition of 1879, Pennsylvania State Agricultural Society:

GENTLEMEN: Feeling a great interest in your Society as a conservator and promoter of most important interests of our Commonwealth, we desire that the best things shall be done to promote your coming annual exhibition, and make it a success.

With this end in view, we would respectfully call your attention to the growing importance of the subject of preserving forests, and our belief that an address on the same would be popular and draw guests to the exhibition, while, at the same time, it would be of special public service. If we can coöperate with you in securing such an address, should you desire one, we will be most happy to render aid in that direction.

(Signed,)
J. F. HARTRANFT,
ALEXANDER WHILLDIN,
CHARLES L. SHARPLESS,
J. L. HARBISON,
DILLWYN SMITH.

REPLY OF PRESIDENT BISSELL.

OFFICE OF COMMITTEE OF ARRANGEMENT,
EXHIBITION OF PENNSYLVANIA STATE AGRICULTURAL SOCIETY,
PHILADELPHIA, *September 6, 1879.*

To Hon. JOHN F. HARTRANFT, AND ALEXANDER WHILLDIN, CHARLES L. SHARPLESS, J. L. HARBISON, and DILLWIN SMITH, Esquires.

GENTLEMEN: I am authorized, on behalf of the Pennsylvania State Agricultural Society, in response to your communication of August 16, received yesterday, upon the subject of forestry, to express their abiding interest upon a matter which so nearly affects the interests of every citizen of the Commonwealth. I would, therefore, call a general meeting in the auditorium of the Main Centennial building on Thursday evening, the 18th instant, at eight o'clock, at which time will be given a public expression of the views of those who have thoughtfully considered the increasing importance of urging this subject upon the attention of the people.

(Signed,)
WILLIAM S. BISSELL,
President Pennsylvania State Agricultural Society.

The meeting was accordingly held in the Permanent Exhibition building; Mr. William S. Bissell, President, in the chair, who said that he and his fellow members of the State Society fully recognized the vital importance of the subject of forestry. He introduced Mr. Geo. May Powell, of

Philadelphia, chairman of the American Institute Forest Committee, and secretary of the International Forest Council.

LECTURE BY GEO. MAY POWELL, ESQ.

Mr. PRESIDENT AND GENTLEMEN: In a peculiar and practical sense, the forest question is paradoxical. The mathematician in his calculations works in part by the rules, "the greater includes the less," and "the whole is equal to the sum of all its parts." Either of several grand divisions of the subject before us on this occasion, however, includes the whole.

With the silvacultural interests of our country so conserved as is demanded by hydraulic power for our gigantic manufacturing industries, or inland navigation in its relation to transportation; in either of several subdivisions of agriculture in respect to the regulation—not increase, perhaps—of rainfall; or in relation to climate culture; and those silvacultural interests are so conserved as to meet the demands of all. The same is true in regard to the supply of timber for fuel and for constructional purposes on land and on sea. When the proportions and positions of forests are such as to preserve the proper equilibrium in either of these departments, they preserve the equilibrium in all. Therefore, the specific consideration on this occasion of forests and climate, will substantially cover the whole question.

Arboreal climate culture, in its bearings on either animal or plant life, is a question of literally fabulous proportions. In any one of the above divisions or sub-divisions, the Great Republic has hundreds of millions of annual values involved. If rain comes at the right times and quantities, Farmer Jones will cut two hundred tons of hay in a season. If it does not so come, he will cut only one hundred tons, and so he must suffer a loss of from $1,000 to $1,500 or $2,000. He is only one of tens of thousands in his State, or hundreds of thousands in the whole country, similarly situated. Farmer Thompson has an hundred acres of wheat, and harvests two thousand bushels, if the rain is properly regulated, and perhaps only five hundred if it is not. If wheat is a dollar a bushel, he has $1,500 trembling in the balance. If half a million or more farmers are similarly situated, there are $750,000,000 at stake. The forest is to the rainfall, in all these relations, what the balance-wheel is to the steam engine. Consequently, a requestion of climate is here involved, covering, in the aggregate, in all these lations, more than ten times enough every year to build a four-track steel railway from Portland, Maine, to Portland, Oregon.

From either patriotic or politico-economic points of view, we can, consequently, hardly fail to see that immediate, vigorous, persistent action, to promote our forest interests, is at once the part of wisdom and of honesty.

Before entering at length on the branch of this subject selected for your consideration, it may be proper to give a very brief *résumé* of work done by our organization.

THE AMERICAN AND INTERNATIONAL FOREST COUNCIL.—A little more than a quarter of a century ago, one of its promoters began the study of forests. His first preceptor was Mr. Arthur Bryant, of Illinois, a brother of Mr. William Cullen Bryant.

Our first recorded pre-organic work was the issue of a forest memorial to the Turkish Governor of Palestine by one of our number who was in that country in charge of the pioneer expedition of the Oriental Topographical Corps; also the subsequent issue of substantially the same memorial to the Khedive of Egypt. This was in the summer of 1873. In autumn of that year, we organized the Forest Committee of the American Institute, in New York city. This committee has since been, and still is, in active operation. In 1874, the constitution of the Forest Council, herewith presented for your personal inspection, was adopted. As is seen, this is the original document, and the signatures of some of the most eminent gentlemen in our country and in foreign lands are affixed thereto. Mr. Alexander Whilldin, of Pennsylvania; Mr. William Cullen Bryant, General John A. Dix, Mr. Peter Cooper, Mr. Burnet Landreth, and Mr. George H. Corliss, as you see, are among the representatives of America, whose autographs are before you; Sir Charles Reed, Sir Redmond Barry, Guyer, of Switzerland; Count D'Assy, of Italy; Cameron, of South Africa; Oldendorff, of South America; and Jordana and Vidal—the two latter, distinguished forest engineers of Spain—are among our foreign constituents.

In 1876, this council held the first congress, specifically devoted to the exact science of forestry, ever held in this country. Through the kindness and liberality of Mr. Alexander Whilldin, of Philadelphia, the first sessions of this congress were held at Cape May Point, New Jersey. By invitation of General Hawley and other officers of the Centennial Exposition—gentlemen whose names also appear on our constitution—the congress adjourned to the Judges' Hall on the exposition grounds, in Fairmount Park. Between the time of the Cape May sessions and the adjourned sessions at the Centennial, another organization, with similar ends in view, was formed at the Judges' Hall. This sister organization is composed of able, prominent gentlemen. The latter is, no doubt, doing good work in a field where there are far too few laborers.

Our policy has been, *first*, "*to reach the people through the newspapers.*" With a generosity, and liberality, and vigor characteristic of the American press, it has so seconded our efforts that we have thus been enable, since 1873, to *issue* and *distribute* the equivalent of over three hundred millions of book pages on this subject. As we have no salaried officers, we have thus been enabled at insignificant expense to scatter a practical forest literature, which, without this free editorial aid, would have cost hundreds of thousands instead of a few hundreds of dollars to issue and distribute by usual methods. This press literature has been devoted chiefly to the most practical points of personal pecuniary interest to the reader, instead of deal ing in broadsides of botany and bewildering grand totals. The latter we think would influence the action of the masses to plant and preserve trees, little more than to tell them about the incomprehensible distances of the stars and their equally incomprehensible speeds of motion.

A work of incalculable value to the forest literature needed by our country has been done by another of our number,* in inducing the Boston Public Library to collect a large number of European works on forests. This he accomplished: First, by correspondence with Hon. Mr. Marsh, in Italy, and others, and so securing a very carefully and wisely selected list of books; Second, by securing the above action by the library mentioned. This list can be seen in the bulletin of that library to be found in all the leading libraries of the United States. (See pages 31, 32, 33, and 34, in bulletin for January, 1879.)

Regret has been expressed that owing to the lack of centrifugal force in a republic, it is difficult to secure needed legislative and administrative action to preserve and promote forests. Our Government being *of*, *for*, and by the people, is centripetal in its action. Therefore securing individual action has seemed to us to be the objective point. By the use we have made of the press, in nearly seven years' work, it has been chiefly the instrument in our hands in procuring the planting of over seventy million trees between the oceans and the lakes and the gulf. A vast amount of other work has been accomplished which there is not time here to enumerate.

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* Rev. Sam. Wells Powell, of Massachusetts.

The Jachin and the Boaz of our work has been first, to show that as less labor than is required to transplant even a small tree, will put scores of tree seeds in the ground, putting seeds where the trees springing from them are permanently to stand, is the great way to increase trees. While this is our leading policy under this head, we do not ignore transplanting. The latter has its place in forest economies.

Second. We have taken very particular pains to show by our papers scattered by the press over the Atlantic and Pacific slopes, and the great basin between their crests, that forest planting and preserving will *pay*. Showing minutely and specifically, *how* it will pay the *individual in his day and generation.*

To a measurable extent, we trust we have thus answered the negative arguments of the Sir Boyle Roach School—a school forever echoing the mean and selfish question: "what has posterity done for us?"

Turning, then, to the specific subject before us of forests and climate, we claim that any one of the great States of our Union has vast sums involved annually in respect to both animal and plant life as conserved by forests.

Recent yellow fever experiences prove the South to have millions of dollars of trade interests per week involved in the subject of public health. A family in good health, North or South, East or West, may earn $1,000 a year net. Sickness in the same family may cause it to suffer a loss, first, of the ability of to earn that $1,000; second, of $1,000 in expenses incurred by sickness. Such a family has thus $2,000 a year involved in the health question. By parity of reasoning, the nation has untold millions every year wrapped up in the health budget. A forest leaf has tens of thousands of valves made on purpose to pump in the poisonous carbonic acid gas and other "enemies" in the air, and pump out life-giving oxygen. The trees are also the chief conservators of those thermal and hygroscopic conditions which determine not only the health of men, but of domestic animals; also the health of fruit and grain-bearing plants. In any one of these relations, forests and climate is a cash question of startling proportions. The human life and health involved, is, of course, not susceptible of financial gauge. A man cannot tell how much he would give to have a dead darling given back to him again.

All this aside from loss of life or health, the value of which cannot be computed. Much of this would be modified or remedied by planting rows, or double, or treble, or quadruple rows of trees around farms and along roads. Thus, a farmer might have a thousand trees where they would harm nothing. If they were nut and sugar-bearing trees, they would soon annually net him more than a thousand sheep, and also add more than their cost to the cash value of the farm. simply as a question of beautifying it.

Plant life thus suffers to such an extent that the zones of some of our most valuable fruits and cereals have moved, in some longitudes, from one to three degrees south.

The narrowing of the winter wheat and the fruit zones, so as to reduce their areas millions of acres, is one result of climate irregularities, where the wild winds hold high carnival over regions denuded of forests.

Forests are wonderfully adapted to contending with malarial conditions. Some single trees, requiring less than one twentieth of an acre of space on which to grow, bear on their twigs four or five acres of marvelous leaf surface. A shelter belt of a few hundred acres of such trees, standing to the windward of a city, or between it and some source of miasma, presents tens of thousands of acres of nature's weapons to contend with our enemies in the air.

Scientific experiments in Europe prove that trees are the health guard provided by God to protect both the animal and vegetable kingdoms from terrible foes—prove this to be as certain as the shortest line between two points being a straight one. By checking the rush of cold and of hot currents of air, trees prevent sudden changes of temperature and of moisture, which increase the number and malignity of diseases long known to physicians. Sudden changes of these conditions produce, also, new diseases in farm stock of all kinds, as well as in families.

The healing influence of the *conifera* upon lung, throat, asthmatic, and catarrhal ailments is another count in the case. The hygienic section of the census maps distinctly show where such diseases are prevalent; and it is startling and significant to find New England, once so grandly rich and beautiful in her robes of evergreen, more scourged in these respects than any other section. For the sake of humanity let us so seek as to secure such action by the State and the General Governments as will, at least, be the beginning of the end of these evils—evils already of gigantic proportions, and which, like the avalanche moving down the mountain, are awfully cumulative in power.

The question of the influence of forests on health in respect to their conservation of extremes of thermoscopic, hygroscopic, and malarial conditions is necessarily a national one. Injudicious treatment of forests in the west, damages not alone the health of that region. Through failure to act on the air-currents passing over it, regions north, south, and east suffer from lack of purification, warming, or cooling, drying or moistening, as the case may be. So also the Silva of the east, north, and south act, or fail to act, on the currents passing over them to the west and to each other. Strip the conifera from the northeast, and then fail to re-plant so as to keep the resinous trees powerfully in the preponderance there, as nature intended they should be, and the air-currents are robbed of much of the healing influence of the balmy aroma distilled by them. An influence mighty to save the peoples of that region from consumption and kindred scourges. Excessive deforesting in the south in turn tends to destroy nature's chief provision for breaking the fangs of malaria in respect to the south, and to prevent the possibility of the southern woodlands purifying the poison-laden air before it passes northward on its mission of death. Thus even the winged winds, which should be angels of life and health as they speed over the earth, are compelled by the folly of man to become spirits of destruction. By the same line of argument, seasons of excessive drought or moisture are produced, prevented, or modified by wise or unwise arboreal administration. Consequently the people of the Ohio valley may be somewhat accountable for the damages from excessive rain or lack of it in the valleys of the Sciota and the Wabash, or possibly in the Missouri and the Platte valleys.

The reasonableness of some of these philosophies is found on a grandly wholesale scale in the improved hygienic condition of Egypt as a result of wise silvaculture. The great Mohammed Ali, grandsire of the late Khedive, planted twenty million trees in the then vice royalty. His son followed his example, and his grandson did likewise in respect to carrying on the forest-creating campaign begun by him. We know of no physical experience more dreamily delicious and health-giving than an early morning walk or ride through bowery colonnades of accacias, which they have planted along miles of avenues leading over the Nile valley in various directions from Alexandria, Cairo, and the Pyramids.

These experiences in the semi-tropics are suggestive " of the land where it is always afternoon," and have a deliciousness almost more than earthly. It may not be in consequence of this tree planting that the plague, which for centuries before their time had risen in Egypt every year, and ravaged the east like a demon of death, is manifestly abated. It is very significant, however, that the two events have been cotemporaneous.

The Ezbekiah in Cairo, which used to be the pestilential center of this plague, has been transformed into a tree-clothed park of exceeding beauty. By these means, as the years come and go, the annual Khamsene, or fiery sirocco, grows less and less a terror to the people. This sirocco, beginning about the 21st of April, and continuing some three months, has long been the occasion of a yearly exodus to the cooler coast region of all whose means made it practicable for them to do so. This change was deemed especially necessary for all who were not acclimated. On the 21st of April, your speaker arrived from the north at Cairo, and found most strangers, and many natives, going or gone to escape the sirocco. We were warned by residents to do as little work as possible, to make a short visit, and return when active operations would be more safe. Circumstances prevented our acting on the advice, however, and day and night, for weeks, we pushed on with exhausting work with no harm to ourselves. We are now convinced there has been a radical climatic change effected in this region, and that the hygienic revolution wrought there has been the peaceful conquest of our Queen of the Silva, as she has laid a silent but potent hand on the pestilence that walketh in darkness, and compelled it to depart. The cash value of all this to the industry and business of that country is immeasurably greater than the cost of planting the trees. *Per contra* the loss to our southern business stopped by the yellow fever has frequently been millions of dollars per week. The vegetable physiologist knows from the structure and functions of the leafy lungs of trees, that a considerable number of them cannot be suitably planted in a malaria scourged region without mighty and manifest results for good.

Another case in point, on a smaller scale, was in New England, where a farmer whose family had been healthy while a beautiful belt of elms lay between his house and a marsh. Demand for elm, for bent work, led him to cut down those trees, because he could sell the timber for a high price. Within a few months thereafter, there was sickness and death in that family. The daughters, who had been noted for rosy robustness, fell into a decline; and the family was saved, it is believed, only by re-planting the sheltering grove, at an expense far exceeding the money received from sale of the timber. A well known authority, in both theory and practice of tree culture, in Massachusetts, reported, in a paper from him, recently published by the Agricultural Society of that State, substantially as follows: His family had been seriously troubled with croup, prior to planting on the side of his country seat most exposed to the prevailing wind of the region. This terror to mothers and their little ones was absolutely conquered by tree planting on the windward side of his villa. Every dollar spent in that operation added scores of dollars to the cash value of the property, either to sell or to keep simply as a question of ornamentation of the premises. The value of life and health saved was, of course, not computable. We had another friend, to whom life was almost a burden, because of a most distressing asthmatic complaint. He was permanently cured by three years residence in a dense pine forest.

The philosophy of the action of forests as regulators of those mighty factors in the problems of animal and plant life—heat and moisture—is made more plain by significant statements of Tyndall. He says, as quoted by Lippincott, that "The imperceptible strata of aqueous vapor near the earth's surface, if in proper condition and position, acts like a covering of glass in a conservatory, in economizing solar heat." Tyndall specifically says that "the removal, for a single summer night of the aqueous vapor which covers England, would be attended by the destruction of every plant which a freezing atmosphere would kill." This strata of vapor is very dependent on forest influences for its formation and regulation. The trees reach out their long strong arms and catch it in their fingers of leaves and twigs as it floats landward from lake and from ocean. By their regulation of rainfall and dewfall in cooling and so compressing the aerial sponge; and by their exhalations, they are the chief agents in the local production of this strata of imperceptible aqueous vapor. By their mechanical action, in checking the rush of wind torrents, they tend to hold this glass-like covering over the earth, unbroken; as the frames and sashes of the hot-house hold their transparent protectors of delicate plant life. Precisely as it thus promotes the life and health of the flora, this heat-regulating aqueous strata also promotes the life and health of the fauna.

The forest regulation of solar heat being what it is to animal and to plant life and health, the nation has in it many millions of dollars annual value involved in respect to agriculture. All this, independent of rain, for the plants to drink, and for manufactures and navigation.

These philosophies have abundant foundation, proof, and illustration in facts known to those who have studied and experimented in these fields of research. They point significantly:

First, to the importance of wholesale energetic immediate production and scattering of the best light on this subject in the form of a *popular* literature. This, as before stated, we have been doing, but we need such co-operation as will enable us to manifold our efforts in this direction.

Second, to the enactment of wise forest laws, provision being made for a competent head to administer them, and to ensure care in cutting what timber is cut, and system in wide and general re-planting.

The intersectional element of this question shows that while in respect to detail the people in their several localities, must do the work, there must also be action by cities, counties, and towns, as well as by States and the General Government, providing for outlining, recommending, and to some extent, perhaps, regulating the work. We need laws providing forest engineers and literature—fire-proof buildings and protection from forest fires; reduction of taxes for those planting trees, so as to squarely meet proper prescribed rules, as certified by a competent forest engineer. There should be no exemption from taxes for foolish or for bogus tree planting. Steep hillsides especially need re-foresting to preserve streams, and are of little value for other use. Re-planting the hillsides, especially the steep ones, is a major factor in the preservation of rivers and harbors from damage or ruin by silting, also in the prevention of freshets. The loss of soil on uplands and covering the fertile low lands with mineral debris. Fire-proof structures, as homes for the common people as well as for public buildings, are the rule in Southern Europe and in large portions of Asia and Africa. Laws with heavy penalties which are rigidly *enforced*, are needed to compel railway companies to take care of their sparks and cinders. As their locomotives rush through the woodlands, they are the most terrible incendiaries of the age. The damage done by the Pittsburgh rioters is insignificant beside the work thus done by these reckless law defying corporations in nearly every State in the Union every year.

Thus, by these and all other means, we can command, let us spread the royal forest robes over the hills and valleys of our fatherland, and the following interests will also be subserved. The loss of land by encroachments of the ocean, the rise and progress of hurricanes and fires, as well as the growing prevalence of insect scourges, will, in a great measure, be relieved.

Birds, for example, are among the most efficient allies of man in his war with insects. Tear down the homes of the birds by cutting away forests, and our active friends are obliged to fly away from the very points where they are most needed. As well expect police protection from burglars, if their homes were torn down, and they hunted with hounds and guns, as to expect protection of feathered police from burglar bugs if they and their homes receive such treatment. The farmers of a single western State, recently lost tens of millions of dollars in a season from locusts. The chief cause of the scourge in this case was destruction of grouse.

We sympathize with a clear-headed Massachusetts young lady, who said, in sweeping terms, "I don't believe in guns." The damage to forests from insect scourges is so stupendous, that the value of the dogs, guns, and saleable value of feathered game slaughtered, is contemptibly small in comparison. Much, if not most of the hunting, is likewise brutal and barbaric in its tendency. It breeds lawlessness and thriftlessness. Forest fires, before alluded to, are also, to a great extent, chargeable to these bird butchering expeditions.

Forests are likewise climatically helpful by cooling the air, and so preventing protracted heat promotive of hatching the larvæ of locusts, potato bugs, and other insect pests.

Locust-scourged portions of oriental countries, are deforested ones, without exception, and the history of ages proves that increase of locusts and decrease of forests have ever been coeval.

I have traversed vast sections of the African Sahara, where I found undoubted proofs that in historic times they had been splendidly forested. That palaces and gardens and magnificent cities had once been there. The races of men who had reveled in the luxury indicated by these remains, had been swept away with them by climatic conditions which have ever followed in the wake of wrecked forests. Wholesale deforesting created the desert. Wholesale reforesting is the means by which most of the deserts on the earth can be "made to blossom as the rose."

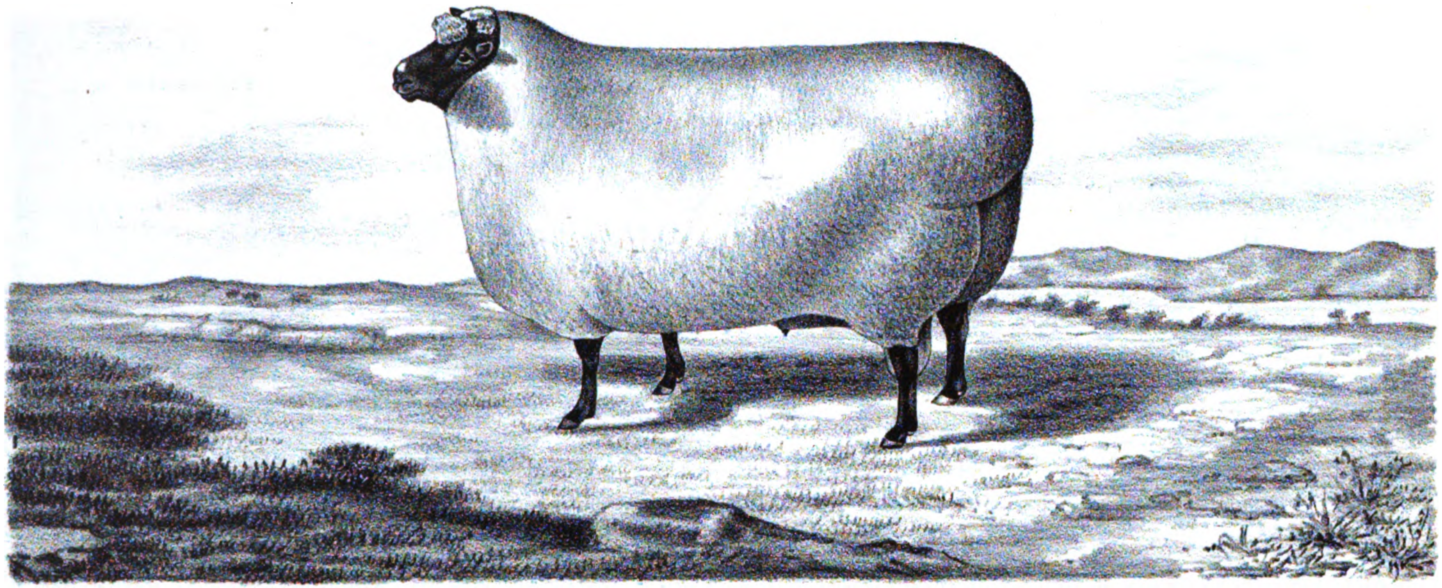
As you stand by the great pyramid, the Arab will point westward over the wild Lybia desert, and tell you that three hours toward sunset will bring you to petrified forests. Here, and at other points in these now scorched, sterile regions, you will find these proofs that beautiful trees once waved their green scepters of health and plenty there. Thus the stones cry out against the foolish waste of wealth, and of the elements which create it. They proclaim in terms which cannot be mistaken, that deforesting without re-planting is killing the bird that lays the golden egg.

The careful student of economies involved in this great question can hardly fail to see the forests as among the most potent, and, in many cases, the only power competent to cope with these ills to which flesh is heir.

Thus, "the leaves of the tree are for the healing of the nations," as in a far higher and grander sense the leaves of the Tree of Life are for spiritual healing.

Mr. JOHN McDOWELL recognized the value of forests in screening from the violence of wind storms and regulating the rain fall. He had listened, with much pleasure, to the lecture of Mr. Powell, and he moved that the thanks of the meeting be tendered him; which motion was unanimously agreed to.

Mr. DILLWYN SMITH related instances of the beneficial effects of tree



Oxfordshire Ram "FREELAND" Owned by A.J. Milton, Druce, England.

Hired at Public Auction for Season of 1876 for 85 Guineas, by T.S. Cooper, Coopersburg, Pa.

FIRST PRIZE PENNSYLVANIA STATE FAIR, PHILADELPHIA 1879.

planting which he had seen in Scotland. In some very rugged and hilly districts the larch had been planted in immense numbers, had grown rapidly into valuable timber, and had sensibly ameliorated the climate.

Professor **KONIG** read a paper on the economical production of charcoal. By the common process of burning in piles, large quantities of wood were wasted. These could be saved by charring in close iron vessels, and so could the gases and vapors produced during the operation. The latter, especially, were valuable, yielding, when condensed, wood-spirit, which was as valuable as alcohol for making varnishes, and for other industrial purposes, and also wood vinegar or impure acetic acid. He described at length a French method of making charcoal, and recommended its introduction.

Dr. **ALFRED L. KENNEDY** urged the necessity of giving the farmer some inducement to retain his portion of timbered land undiminished, by relieving it from taxation. If the retention of woodland benefited the public, then the public ought to be willing to give some equivalent to the owner, who kept it intact. In this part of the State, especially, it was more profitable to cultivate land than to keep it in wood, and if farmers were expected to refrain from clearing it off, some concession must be made them from the tax rate. Heavy masses of timber were not required in order to screen the country from violent winds. Narrow belts or lines of trees answer the purpose, and the planting and maintaining of these, the Pennsylvania State Agricultural Society had sought to encourage by introducing and having passed through the Legislature, what is known as the "tree bill." This act relieves, from a portion of his road tax, every farmer who plants trees along the public highway, in front of his property, and who renews those destroyed.

Mr. **G. M. POWELL** was very glad to be informed of this action of the State Society and its success. If carried out, it will go far to lesson the evils caused by the denudation of the forest land.

Mr. **DAVID H. BRONSON** could not agree with all the points of the lecture. At any rate, he did not see any cause for alarm. His county (Chester) had all the woodland she needed, and it would be hard work to get the farmers to plant forest trees on their arable acres. Land was too valuable. Some of the evils alleged to flow from the clearing of the land, were probably due, in part, to other causes. The past season had not been attended by any of the evils attributed to the absence of forests. Sunshine and shower had alternated regularly. There were no indications of drought, and fine days were sufficiently numerous to permit crops to be garnered in prime condition.

Letters were read from Messrs. Thomas Meehan and B. Landreth, expressing warm interests in the objects of the meeting, and regretting that absence from the city prevented their attendance.

Adjourned.

ANNOUNCING THE AWARDS.

FRIDAY, SEPTEMBER 19.

The stage of the main centennial building has seldom presented a finer appearance than during the ceremonies which attended the announcement of the awards of premiums.

His Excellency the Governor of the Commonwealth and his staff, the officers of the State Agricultural Society, and the members of the various juries of awards, many of them distinguished for their scientific and industrial attainments, filled every seat on the spacious platform. When the inspiring strains of the orchestra ceased, President Bissell rose and stated briefly to the large audience the purpose which had brought so many together. He then introduced Governor Hoyt, who spoke as follows:

THE GOVERNOR'S ADDRESS.

Mr. PRESIDENT, LADIES AND GENTLEMEN: The President of this Society has given me very little intimation of what was expected from me on this occasion. If he supposes that I came here deliberately to dogmatize about the technicalities of agriculture, he is mistaken. I came here and found myself an absorbed spectator, surprised, gratified, and dazed at this exhibition. That the Pennsylvania State Society, which, I may be permitted to say, has never done itself too much justice, should have ventured to absorb all this building, with its memories of the great Centennial Exhibition, only three years after, was a specimen of hardihood, and yet, fellow-citizens, I am told that it is a success, I am told that these farmers who have ventured to project this great show upon this community are satisfied with the result. I think persons who have taken premiums here ought to congratulate themselves that somebody else did not get them. The exhibitor who gets premiums here must feel the tread of competition upon his heels, and he must be satisfied in his mind that the judges have awarded him the prize for the excellence of his exhibit.

Now, fellow-citizens, such an exhibition as this, suddenly put out here, after four or five years of depression and distress, startles you, as it has startled me. These men are producers. These are the men that make things; and the trouble of this country for a few years past has been that we have failed to look to the producers.

You have taught yourselves and us this lesson, that the men who go around the country preaching classes, the men who go through the country talking about capital and labor as being two distinct classes, are mischief makers. The men who have shown the real destiny of the country are the farmers. I reckon that to be a proud day for this country, and a settled fact in the providence of God, that America is to feed the universe. The Pennsylvania farmers need not fear the competition of the great West. They need not distress themselves about cheap freights and freight discrimination. The Pennsylvania farmers are in no danger, because we have our own market. As representing in some sense a very large number of the people of the Commonwealth, I felt it my duty to appear here and express my sympathy for this cause—for this department of industry upon which all organized society finally rests.

At the conclusion of the Governor's address, the list of prizes was read by the Corresponding Secretary, Elbridge McConkey, assisted by chief clerk Nebinger.

REPORTS

ON THE

DEPARTMENTS OF THE EXHIBITION.

DEPARTMENT I.—Live Stock.

Being the prize report on this Department, with supplementary notes by Dr. L. HENRY TWEDDELL, Superintendent.

On the day prior to the formal opening of the exhibition, a seemingly endless line of wagons was drawn up in front of the Centennial depot of the Pennsylvania railroad, and, as the freight trains came rolling in with their loads of cattle, machinery, and products of the farm, a small army of laborers transferred the contents to the wagons, and the latter went off to the grounds. All day long this scene was continued, and, in the evening, the building was lighted, and the final preparations continued throughout the night.

The number of live stock on the ground in the evening, gave assurance that this section of the fair, at least, would be an undoubted success. Nearly every stall on the double row, on the north and south sides of the eastern half of the building devoted to cattle had its occupant. In various sections following each other were Ayrshires, Holsteins, Devons, Guernseys, Jerseys, working oxen, and fat cattle. Many of the animals, tired with their ride on the rail, were stretched out on the straw in an easy attitude.

Some of the finest specimens were wrapped in blankets before being dispatched from home, and on their arrival in the building, they were subjected to a thorough brushing down and cleansing, an operation which, to all outward evidence, gave them considerable satisfaction. Some of the animals had traveled a considerable distance, the eighteen Shorthorns shown by L. H. Long having come direct from Marshall, Kentucky, a distance of over seven hundred miles, while fourteen head of Durham Shorthorns came from London, Madison county, Ohio, about a similar distance. In the course of the afternoon, the cattle from adjacent counties began arriving on the ground in large numbers, among them a dozen fine thoroughbred Holsteins from the Gwynedd herd.

Most of the poultry intended for the fair are in place. The location of this exhibit is south of the main aisle, near the extreme east end of the building. Here are four rows, or about two hundred coops, filled with Toulouse geese, white-crested Poland ducks, Peking ducks, black and white bantams, pigmy roosters, silver-wing ducks, Jersey blues, American Dominiques, Houdan chicks, black Leghorns, carrier pigeons, Muscovy ducks, and other varieties of poultry. A large number of Himalaya rabbits also find a place in this section.

There are twenty-one exhibitors of sheep. The only exhibit in this line from a long distance is that of J. P. Giles, of New York State, who sends eight pens. Spanish merinos are shown by W. L. Archer, of Washington county, who paid the high price of $5,000 for the sire of two of his animals. There are fifteen exhibitors of swine, the breeds comprising Chester Whites, Yorkshires, Berkshires, and Essex. The sheep and swine pens are in the grounds, fronting on Elm avenue. At eleven, daily, there will be parades of cattle in the space east of the pens.

The display of thoroughbreds, draught, harness, and saddle horses is located on the northwest avenue. Several imported Lincolnshire draught stallions, and four Shetland ponies, are prominent features of the section.

Seventy head of pigs and a half dozen Scotch shepherd dogs are from J. S. Walters & Son's farm, in Westown, Chester county. The pigs were inclosed in boxes, according to their size. The largest arrival was a Chester White boar, weighing eleven hundred pounds, a weight which, it is claimed, cannot be equaled in this State. There was also a large sow, weighing eight hundred pounds, which littered only ten days since.

The arrangement and construction of the stalls and pens give great satisfaction to all the stock men. There is an abundance of light, and every opportunity of inspecting the animals.

The arrangements for keeping the building clean, and preventing the odor which usually accompanies such exhibitions of stock from becoming offensive, are all that could be desired, and the utter absence of any such disagreeable odors is frequently remarked by the visitors. This is attributable to the general care which is given to the stock, they being cleaned every day, the frequent changing of the bedding, and the immediate removal of the soiled straw, &c.

GROUP I.—HORSES.

The most distinguished families of the American turf are represented: Fourteen Hambletonians, two Patchens, three Black Bashaws, two Happy Mediums, two by Jay Gould, four by General Knox, five by Inkerman, two by Draco, and single representatives of Alexander's Ed. Forrest, Champion Morrill, Tippoo Bashaw, Aberdeen, Mambrino Pilot, Black Dutchman, Highland Golddust, Thomas Jefferson, General Mott, Young Morrill, Alhambra, and Ashland.

The thoroughbred stock represented, are by Leamington, Harry Bassett, Planet, Vandal, Priam, Reviler, and Censor. Prominent in the collection are the descendants of Rysdyk's Hambletonian, who sired more foals than any other stallion of any age, and their showing upon the turf clearly entitles him to stand preëminent as the great progenitor of trotting horses. Hambletonian was foaled in 1849, and was bred in Orange county, New York. He was sired by Abdallah, son of Mambrino by imp. Messenger. Abdallah's dam was Amazonia, who was first claimed as a Messenger, then as by a son of Messenger, but it is generally conceded her blood is entirely unknown. Hambletonian's dam was by imp. Bellefounder; second dam by Hambletonian, son of Messenger, third dam by Messenger; which gives him one direct cross of the highly-prized Messenger blood on the side of his sire, and a double cross on the side of his dam. Hambletonian and his mother were sold for $125, and when a two-year-old, four mares were bred to him, from which resulted three foals, one being the famous Alexander's Abdallah, the sire of Goldsmith Maid, Almont, Belmont, and other noted horses. As a three-year-old, Hambletonian had a few months' turf experience, but he did not promise well as a trotter, and he was retired. His greatest service in the stud was in the years 1865 and 1866, during which he was permitted to serve four hundred and ten mares at $300 per head. His fee was then fixed at $500, and remained at that price up to the time of his death, in 1875. Hambletonian was a horse of great substance, but at the same time without a particle of grossness. His bone, though heavy, was of fine form and texture. In color he was a rich mahogany bay, with a small star, and two white ankles behind. His head was large and bony; jowls deep, eyes large and prominent, ear large, neck rather short and heavy at throat latch, but thin and clean; shoulders very deep, oblique, and strong; withers low and broad; back short; coupling excellent, and enormous length from point of hip to hock; broad, flat, clean legs, hocks well bent, pasterns long, and hoofs splendid.

Fourteen descendants of Hambletonian are on exhibition. A bay stallion, named Inkerman, sixteen hands high, foaled 1870, and bred by J. B. Baker, Ingleside stock farm, Thornedale, Chester county, Pennsylvania. Inkerman was got by Speedwell Hambletonian, a son of old Hambletonian; dam Lucy, by Fenimore's Trafalgar, a horse bred and raised by Allen Fenimore, near Mount Holly, New Jersey. Inkerman is a handsome and vigorous horse, beautiful in color, and has all the points that are so essential to constitute a perfect horse. Inkerman has but six foals to his credit, the oldest of which is but five years old. Among those on exhibition are Hannah Inkerman, with foal at foot by Dallas Inkerman, four years old, out of Hannah, she by Arcola, by Lexington; Betty Inkerman, also with a four months old foal by Dallas Inkerman; Brita Inkerman, a yearling, dam by Knight of Ashland; Edna Inkerman, two years old, and Ethel Inkerman, three years old, out of a son of Gray Eagle.

McKean & Hulick, of Easton, have, in the bay stallion Eddystone, six years old, fifteen hands three inches high, quite a stylish and an unusually well-formed horse, combining all the good qualities that go to make up a trotter. Eddystone was got by Ashland, he by Mambrino Chief, dam Utilla, (thoroughbred.) The dam of Eddystone was Sally Graham, by Volunteer.

Warne's Hambletonian, the property of Mr. Warne, of Easton, is by Rysdyk's Hambletonian, dam by Deble's Black Bashaw, shows high breeding, has plenty of substance, and is altogether well proportioned.

Earl of Aberdeen, the property of W. W. Colket, of Philadelphia, is of a bay color; by Aberdeen, son of Hambletonian; dam, Sunnyside. He is a horse that possesses many of the good points that turfmen like to admire; has intelligence, is of an amiable disposition, and, for general conformation, should produce valuable youngsters.

General Grant's dappled grey Arabian stallions excite much admiration, especially when they are being aired in the horse-ring.

Warwick, the property of Wilson Brothers, of Huntingdon, Pennsylvania, is a bay stallion, and, as Mr. Wallace gives it, was foaled in 1866, by Rysdyk's Hambletonian; dam a mare raised by Morris Hough, of Orange county, New York, and represented to be of Messenger descent. Warwick was raised by Mr. A. F. Hoyt, of this city, and by him was sold to Mr. Charles Matthews. He is fifteen hands and one inch high, has a good strong back, powerful hind quarters, and, but for his small-proportioned shoulders, would be a horse of unusual symmetry and style.

Dick Dawson, the property of D. Killion, Philadelphia, is a bay stallion, by Hamlet, by Rysdyk's Hambletonian, dam by Conklin's Star. He is a well-developed five-year-old, clean and strong-limbed, is thoroughly broken, and is said to possess good style and action.

Bay stallion Fleet Medium, the property of Samuel Wilson, Philadelphia, was got by Mr. Robert Steel's Happy Medium out of Jessie, by Legal Tender, the sire of the famous trotter, Red Cloud. Fleet Medium is four years old, fifteen and a half hands high, and shows high breeding.

Saturn, bay stallion foaled 1876, was got by Alhambra, by Middletown; he by Rysdyk's Hambletonian; dam May Queen, by Alexander's Norman.

One of the chief points of attraction in the collection is the box-stall, with the placard, "Blumberg's Black Bashaw, twenty-four years old; the sire of Cozette and John H." This horse, notwithstanding his age, shows much of the old spirit, and, during his exercise to harness, before the judges of award, one could not help admiring the style and action of so old a horse. Black Bashaw was foaled in 1855, in Michigan. His sire was old Black Bashaw; dam Betsy by Jackson.

Among the other noted representatives of celebrated sires is Harry B. Patchen, a brown stallion, fifteen years old, sixteen hands and one inch high, and the last of the get of that renowned trotter, George M. Patchen. His dam was by Mambrino, and, as a four-year-old, got a record of 2.44. His service in the stud was mostly in Virginia, and little is known of his progeny, but his uncommonly strong and good points and capital action could hardly fail to produce a good result.

Wilson's Trafalgar, the property of Mr. Samuel Wilson, is a black roan stallion, fifteen and a half hands high, and was foaled in 1873. His sire was Young Trafalgar; gandsire, Bay Trafalgar; dam, Rosa Bonheur, by Black Bashaw. This stallion has much about him to admire, being strongly developed, with a good set of limbs, beside possessing plenty of trotting action. Wilson's Trafalgar has a seventeen-months-old son, out of Phœbe, by Tippoo Bashaw, which resembles the sire greatly.

Mr. M. W. Sloan, of Marple, Delaware county, has a vigorous and pleasing-looking stallion in Ypsilanti; brown in color, eight years old. His sire was C. J. Leiper's thoroughbred stallion, Colonel Jones, he by Young Morrill; dam Lady Baker, by old Ethan Allen.

Black stallion Sherman Morrill, the property of John Hunter, is well bred, being by Young Morrill; dam Topsy, by Bay Sherman. This stallion was handled by John Leavitt, when a five-year-old, and, at that time, showed himself to be quite promising.

B. Frank Watson, of Forest Grove, Bucks county, has a strong, powerfully-developed stallion in Sir William, ten years old, sixteen hands three nches high, by General Mott, he by North Star; grandam owned by Mr. Charles L. Sharpless.

John Sellers, of Huntingdon, Pennsylvania, has a beautiful representative of the renowned stallion Thomas Jefferson in Prince Edward, foaled June 8, 1879, out of Queen Daisy.

Mr. Charles Lafferty, of Philadelphia, has two as well-bred colts as can be found in the exhibit. Trifle, a two-year-old, is a bay stallion, by a son of George M. Patchen; dam by Blue Bell. Jimmie Gould, a three-year-old, by Jay Gould, a son of Rysdyk's Hambletonian. He also exhibits the brood mare Fanny Hill, by Alexander's Edwin Forrest, with foal at foot two weeks old, by General Washington, the sire of Goldsmith Maid's first colt.

Mr. Henry F. Coates has the bay mare Dutch Girl, seven years old, fifteen and a half hands high, by Black Dutchman, by Doble's Black Bashaw; dam by McKelvey's Expedition, son of Allegheny Chief.

Maggie Golddust, the property of McKean & Hulick, Easton, is a bay mare, three years old, by Highland Golddust; dam by Royal George.

Mr. John Hunter has three distinguished youngsters in Roderick Dhu, two years old, by General Knox; dam Vickey, by Young Morrill; Lord Byron, three years, by General Knox, and a yearling named Hamlet, full brother to Lord Byron. In addition to these, Mr. Hunter has a very handsome black imported Shetland pony, named Clip, eight years old, which is quite attractive to visitors to this department.

Mr. Samuel Wilson has Happy Maid, by Happy Medium, three years old; bay mare out of Rosa Bonheur, in foal by Administrator; Phœbe, five years, by Tippoo Bashaw; dam, Sparkle, by Rysdyk's Hambletonian, and the brood mare Jessie, by Legal Tender, with foal at foot by Wilson's Trafalgar. Jessie has been bred again to Administrator.

Mr. Charles L. Sharpless has also Sparkle, eleven years old, by Rysdyk's Hambletonian, and daughter, Pearl, yearling, by Blumberg's Black Bashaw; a fine two-year-old in Lottie Knox, by General Knox, out of Selina, by Toronto Chief, and the brood mare Low, bred by General Cadwalader, with colt, six weeks old, by Blumberg's Black Bashaw.

A giant horse is the bay gelding Pilot, by Mambrino Pilot, six years old, eighteen and a quarter hands high. It is quite an attraction.

In the collection of thoroughbreds will be found Dr. Stellwagon's bay horse Mattoon, eleven years old, by Vandal, out of Margravine, an old racer, and a finely-developed sorrel filly, two years old, by Harry Bassett, out of Phœbe, by Kentucky; dam Satinstone.

Reviler, bay stallion, is owned by P. J. Stewart, West Goshen, Chester county, comes from a rather noted and a fashionable family, his sire being Censor, by Lexington; dam Jennie Rose, by imp. Glencoe.

George Ashbridge has Sir Charles, four years old, by Priam; first dam by Mambrino Chief, second dam by imp. Margrave.

The great Leamington is represented by the familiar race horse Lounger, the property of J. F. Keene. Mr. John Patterson has Priam, six years old, by Planet; first dam by imp. Priam.

The Clydesdale imported stock, a breed of horses entirely local, and used principally for draught horses, is represented by three fine specimens, the property of James Glover, of England. Modern Type, one of the collection, is but four years old, yet he stands seventeen hands high, and weighs two thousand four hundred pounds.

The Lincolnshire, England, is another breed of draught horses, entirely distinct from the Clydesdale. Charles Board, of London, England, has the only two representatives of this breed in the exhibition.

Among the other notable horses on exhibition are those of the Percheron breed, which are of Arabian origin, introduced, acclimated, and perpetuated in Perche, France. The Percherons exhibit great endurance, moving fast with heavy loads. They are particularly adapted for draught purposes. This collection comprises Mr. J. J. Parker's stock from the Chestnut Knoll stock farm, West Chester, Pennsylvania. Washington is a dapple gray, seven years old, sixteen hands high, and weighs one thousand five hundred and fifty pounds. In addition to the Percherons, Mr. Parker has three of the celebrated Jenifer Arabian stock, which was imported into Maryland by Colonel Jenifer.

GROUP II.—CATTLE.

SHORT-HORNS.

The Short-Horns head the cattle list in the catalogue, and are well represented. The breeders of Short-Horns claim them to be of early maturity, and good milkers, and also that they will make more beef, from eighteen months to two years old, than any cattle in the world, excepting perhaps the Herefords.

[When we remember that Pennsylvania is a dairy State, and that the beef breeds of cattle are but little cultivated, we are agreeably surprised at the magnificent exhibit before us; it is true, that sister States have sent their representative animals, and have won recognition. A number of well posted cattle breeders remarked before the fair opened, that we would fill our stalls with Devons, Ayrshires, Holsteins, and Jerseys, but they feared the Short-Horns would be few in number, and of doubtful quality. Nerved to extra effort by these doleful predictions, the committees interviewed the leading breeders, and received a hearty response, as on the opening day all the stalls assigned to this breed were filled, and extra ones had to be built.

Of the quality of the animals, it is sufficient to say, that it was of the best, the most fashionable Short-Horn blood was before us for comparison and inspection.

The herd of David Selsor, of London, Ohio, lead by that noble bull, Duke of Greenwood, with Profitable, ninth, Profitable, twelfth, Profitable, fourteenth, and Greenwood Louan, thirty-fourth, a quartette of cows simply perfect, are a sight not soon to be forgotten.

Then we have F. Y. Clopper's herd, so nearly balanced with the above, that many a skilled judge confessed himself puzzled to choose between them and Duke of Skara Glen, Second Duke of Skara Glen, and Maid of Skara Glen Third, will satisfy the most fastidious fancier of the breed.

William Steel, Greensburg, shows a high class bull in Prince Van Metre.

We much fancy the two year old bull Quinton, owned by George Ashbridge, West Whiteland, and Eighth Duke of Wheatland, owned by A. P. Lewis, of Media, we predict will make his mark when age matures him.

T.]

Mr. L. H. Long's collection are all registered. He has four bulls. These are: Fourth Duke of Mason, by Airdrie, dam Suda Clifton, by Clifton Duke.

Mason Airdrie, red and white, out of Jenny Duke, by second Duke of Mason.

Duke of Fleming, red, calved 1878, by fifth Duke of Mason, dam Dora Duke, by by second Duke of Mason.

Duke of Thorndale, roan, calved 1879, by Lord Bates, dam Granny Duenna, by Prince Geneva.

Of the cows and heifers exhibited by him, Mary Leslie, red, calved April 2, 1872, by Muscatoon, dam Myra Renick, by Union Duke.

Highbanks Wiley, red roan, calved August 29, 1874, by Wiley Oxford, dam Kate Bell, by John Bell.

Duchess of Mason, red and white, by second Duke of Mason, dam Ella Duke, by Duke of Mason.

Fern Princess, red roan, by Baron Gynne, dam Red Fern, by Stonewall Jackson.

Rosy Gynne, red roan, by Baron Gynne, dam Highbanks Wiley.

Among other Short-Horns on exhibition, are a bull calf, Captain Leigh, red, three months old, well grown, and a bull, Blue Jeans Williams, nine months old, the property of David Selsor, of Ohio.

DEVONS.

This race of cattle is noted for size and color, being either a cherry red, or a shade darker. The Devons are divided up into what are known as North and South Devons, but the latter are larger, coarser, and of very dark color. The North Devons are a good race for the butter dairy when bred for the dairy, but their chief usefulness is for their beef. In the Eastern States, they are frequently used as work cattle. North Devon cattle should have very close and smooth hair, being curly about the head and neck. A fine herd of Devons belongs to J. B. Longenecker, Union Deposit, Dauphin county, Pennsylvania. Most of his stock was got by President, a bull which had a great career in England, and is now on exhibition. The President was calved in November, 1866, and was bred by James Davy, North Moulton, England. He was imported by the late George Patterson, in 1868, and was afterward purchased by Mr. Longenecker. The President was sired by Duke of Flitton second, dam Temptress, by Davy's Napoleon. The President has taken a number of prizes, the principal one being the Champion cup of the Maryland Agricultural Society. Duke of Dauphin, another exhibit, a son of the President, out of Red Lady, was calved March, 1878. He is a well proportioned bull, and looks every inch a Devon. Prince Edward, another fine young bull, is a full brother to the Duke of Dauphin. Among the cows deserving special mention are:

Red Lady, with bull calf four months old. Red Lady was calved December 3, 1870, by Alexander, dam Lily.

Deer, calved February 4, 1874, by the President, dam Topsy.

Mary May, calved February 20, 1875, by the President, dam Minnie Prize.

Mountain Maid, calved April 17, 1876, by the President, dam Farry.

Mountain Stark, a beauty, sired by the President, dam Red Lady.

Helena, calved October 7, 1877, by the President, dam Deerfield.

Clover, calved November 10, 1877, by Prince John, dam Annie Laurie.

Dora, calved December 10, 1877, by Andrew Jackson, by the President, dam Emma's Pride, by the President.

[John Miller, of Washington county, Pennsylvania, exhibits a herd of great merit. His bull Barrister, is a grand animal, in the pink of condition, and full of quality.

The cows, Belle Patterson, sixth, Belle Flora, ninth, and Rena, fourteenth, are typical specimens of the breed, and are remarkably promising as dairy cows, showing conclusively that Devons, when carefully and scientifically bred, have a value at the pail, as well as on the shambles or in the yoke.

Another splendid herd is that exhibited by D. and J. Banker, of Franklin Forks, Pennsylvania. Their bull Prince of Wales, nineteenth, a superior young animal, heads the herd. Edith, fifth, is a magnificent cow, one of the kind that fills a judge's eye. Belle, eighth, Bright Promise, second, and Rose of Baltimore, are all highly meritorious.

Dr. Morris, of Chester county, Pennsylvania, shows a useful herd of a different style from the foregoing, but evidently good milkers. They have apparently had no special preparation for the fair, and are in their ordinary farm condition, for which due allowance must be made. T.]

AYRSHIRES.

Ayrshires derive their origin from the county of Ayrshire, Scotland. They are larger than either the Jersey or Guernsey, and for beef they are better than the two named, on account of size. The breeders of Ayrshires, however, claim that they are even better milkers than the Jerseys and Guernseys. The points of a good Ayrshire, are the straightness from head to hip, large and crooked milk vein, running up to the fore shoulders, and a good escutcheon, with hair lying smooth.

Prominent among the collection of Ayrshires, is the imported and home-bred Roadside herd of Thomas T. Tasker, Delaware county, Pennsylvania. The imported bull, Red Butterfly, is one of the chief attractions of the herd, being an animal of great beauty. He was calved in Scotland, five years ago, his sire being Little Prince, dam Martha. A majestic looking animal is the stock bull Prince of Ridley, calved October, 1875. The premium cow in the herd is Red Rose, imported, aged eight years and three months. Red Rose has given an average of three thousand two hundred and forty-sixquarts per year for three years, and has won first prize as being the best milk cow in Scotland. Another great milk cow is Avondale Beauty, imported, eight years and four months old. Her average for three years was three thousand one hundred and fifty-five quarts per year. Hensie, home-bred, aged nine years and seven months, had a fine record as a milker, her average being three thousand three hundred and eighty-nine quarts per year for three years. The cow which attracts particular attention, however, is Lady Fleming, two years and six months old, and a perfect little model. She was bred by Mr. Tasker, her sire being Champion, dam Primrose.

Louis Jack, Media, Pennsylvania, has a conspicuous collection of Ayrshires. Among them are the bull Spruce, two years and eight months old, sire Arthur, dam Minnie; imported Handsome, over seven years, with bull calf; Handsome Charlie, out of Handsome, by Prince Charlie; Rosa Second, seven years old, dam Rosa, sire McAvor second; Rosa Loring, over eight years, dam Rosa Third, sire, Bell; heifer Jennie Darden, dam Beulah, sire, Duke of Hamilton Second; and Cloud & Sons collection of calves.

[T. S. Cooper, of Coopersburg, Pennsylvania, exhibits a very symmetrical bull in the Pretender, and his cow, Queen Mary, is our ideal of the breed, of characteristic form and color, and carrying a square and perfect udder; the balance of his herd is in accord with the above mentioned animals. T.]

HOLSTEINS.

The Gwynedd herd of Mr. William M. Singerly, is the only breed of this kind on exhibition. The animals are conspicuous, chiefly for their size and color, which is distinctive of the breed, black and white. The Holsteins possess unmistakable milking qualities, and it is claimed that they are superior in that respect to any other kind of cattle. There are twelve head of imported and homebred in the collection, of which the chief attraction is the bull Oneida Chief, three years and ten months old, big sized, but well proportioned. His sire was imported Kent, dam Ella.

Bull Aurora, is two years and eight months old, sire, Holland Prince, dam Gentle Annie, by Elsewert, grand-dam imported Juffron.

Dairy Maid, bred in Holland, by Jan Groot.

Imported Antjeal, calved spring 1878, sire, Zoandorn, dam Catherina, imported from North Holland, 1878.

Karisino, calved 1874, bred in Holland, by Maria Grod, sire Nederland, dam Alma.

Letto, calved spring 1876, bred in Holland, by Peter Schoon.

Vineta, calved July 27, 1876, sire Hector, dam Adele.

Jenny, calved March 20, 1877, sire Roland, dam Dora.

Imported Talma, calved April, 1878, sire Harma, dam Giziena, imported from North Holland, 1878.

Imported Kathrina, calved 1878, sire Holland, dam Gertrud, imported from North Holland.

Imported Gretze, calved 1878, sire Groot, dam Jana, imported from Holland.

Imported Tinaj, calved 1878, sire Gosselbje, dam Catrinka, imported from Holland.

JERSEYS AND GUERNSEYS.

Considerable rivalry exists among the breeders of Jerseys and Guernseys as to the respective merits of the cows for dairy purposes, but, taking into consideration beauty of form as well as good production of milk, the Jerseys have the preference. In this country the whole attention of a breeder of Guernseys is to milk, leaving form and color to take care of themselves. The breeding of Jerseys is the very opposite, form being one of the highest considerations as well as good milking.

The Jerseys, as a general rule, are finer skinned, smaller, and altogether more blooded-looking animals than the Guernseys. The peculiarities of a good Jersey cow are in the rich yellow skin, fine bone, light neck, deer-like head and countenance, waxy horns, that is, part of the horn which resembles yellow wax, a wedge-shaped body—narrow at the shoulders and widening out behind—a long and prominent milk vein, and a capacious udder.

The Guernseys should be similarly developed, but those on exhibition do not show up in form and general appearance nearly as well as the Jerseys. The first Jerseys imported into this State were by Doctor Twaddell, of West Philadelphia, in 1856. Previous to that time, however, the doctor's attention was given to the breeding of Guernseys, and, although now a warm admirer and one of the most thoroughly versed men on the subject of breeding of Jerseys, he claims that a pure-blooded Guernsey is a more valuable animal for the dairy than a Jersey, and the fact of their not being popular in this part of the country, is because dairymen have never given them a thorough trial.

The most admired by visitors in the Jersey cattle department, are the imported cow, Lady Mary, and the bull, Chelton Duke, the property of T. S. Cooper, Coopersburg, Pennsylvania. Lady Mary is silver gray in color, three years old, with deer-like head, ears yellow-lined, another strong point in favor of a blooded Jersey, a body which no one can possibly find fault with, handsomely formed limbs, a full udder, and a most prominent milk vein. The bull Chelton Duke is bronze in color, with a form that is thoroughly consistent in a well-bred Jersey. This bull was bred by Mr. Charles L. Sharpless, and at the Centennial Exhibition carried away the sweepstakes prize.

Mr. Samuel J. Sharpless, proprieter of the Lenape farm, "Street Road" Station, Chester county, Pennsylvania, has a herd of seven, the chief of which is the bull Lenape, dropped April 5, 1877. He is of solid fawn color, black tongue and switch, and was sired by Vermont, dam imp. Magna, a great butter maker. Alroy, a little over a year old, sired by a son of Niobe, dam Ambrosia, is a youngster very likely to mature into a handsome and well-developed bull. Among the imported cows are Jewel Beauty, eleven years old, solid dark fawn in color, black tongue and switch. This cow is well formed, and has all the nice points of a Jersey strongly marked. In an adjoining stall to Jewel Beauty, is Stella Le Brocq, solid gray fawn in color, black tongue and switch, sired by Welcome, dam Stella. Both of these cows took the highest award at the Centennial. Ester, of Lenape, dark fawn, sire Berger second, dam, Lady, is greatly admired by good judges of Jersey cattle, for her unusual good quality and fine appearance. Clio third, a gray fawn and white home-bred cow; dropped March 14, 1871; sire, Monmouth, dam imp. Clio, shows high breeding in a clean-cut head and neck, and body of good proportions. Cecile, gray fawn, sire, Sir Walter Raleigh, dam Carrie Cuba, and Verona, solid dark fawn, sire Gil Blas, dam Verona; are both good looking, and possess a number of strong points of the Jersey.

The Beachwood Stock Farm, Lionville, Chester county, the property of William Barnett, is represented in a choice collection, included in which is the Bull Margrave, solid dark fawn in color, with black points; dropped April 29, 1876. This bull was bred by S. J. Sharpless, and of his sire, Hampton Duke, he being by imp. Orange Peel; and of his dam Margot, a decendant of Niobe, which received first prize at the Centennial, there can be no question as to the excellence of breeding. Margrave is particularly noted for his noble and vigorous appearance, fine head, large and brilliant eyes, straight, strong back, and good escutcheon. Of the imported cows and heifers, Patience of Trinitaise, cream fawn color, five years old, dam Trinitaise, sire, Welcome; has the appearance of being a good milker. Elma II, two years old sire Margrave, dam Elma, is strongly marked. Elma III, home-bred, a daughter of Margrave, is a heifer showing fine quality and substance, while in the Belle of Uwchland and Favorite of Uwchland, the former dropped in March, 1876, and the latter in the same month, 1878, Mr. Barnett has a cow and heifer of unusual merit.

The representatives of the Elizabeth Stock Farms, belonging to the estate of the late G. Dawson Coleman, Brickerville, Lancaster county, Pennsylvania, and of which Colin Cameron is the agent, show by their form and quality that they are purely bred. Fifteen head comprise this collection; the bull, Vesper's Royal Son, three and one half years old; Louisa Daw, ten years, with heifer Louisa Barron, one month and thirteen days; Miss Vesper, five years, and Nancy Dawson, eleven years, forming the chief attractions among the older stock. The youngters are well represented in Willow, Alice and Emmie's Dawson, over a year old, and the bulls, Kilgore and Coxcomb, of Pine Cliff.

Mr. Charles L. Sharpless, Philadelphia, has seven head on exhibition, and their general good looks and excellent quality give them unusual prominence in the department. The bull, Comet, of Marlborough, five years old, and the imported cows Tiberia, twelve years; Milkmaid, twelve years; Black Bess, ten years, and Reindeer, three years, are conspicuous.

The Oak Lane Stock Farm of Mr. James Young, Middletown, Pennsylvania, has an excellent collection. The bull, Sir Billy, three and one half years old, of good quality and appearance, and Sir Aldewin, nearly three years old, have much to commend, while in the selection of cows, Mr. Young has given the fair the benefit of his long experience as a breeder, by exhibiting none that do not show the fine blood of the Jersey in almost every particular.

William R. Williams, Falls of Schuylkill, has a good-looking bull in Black Prince. John H. Benjin, Germantown, has a well-bred bull in Plon Plon II, by Plon Plon, by Duke of Jersey, dam Mignonne. The dam, by Plon Plon, was by Jena, by St. Helier, dam Binga.

Henry C. Palmer, of Chester, has in Lucy C., one year old, a heifer of unusual excellence. The House of Correction, Philadelphia, has a representative in the bull Union, fifteen months old, and Charles Lafferty, Philadelphia, exhibits three young bulls, aged two, nine, and twenty months. The same gentleman also has the imported cows, Modestie, and Modestie II, of solid fawn color, of good form and quality.

In Mrs. Hugh McIllvain's are some decendants of the first families of Jerseys imported into this State. The cow Emma Mac II, over six years old, shows good milking qualities, and was awarded at the Centennial a medal and diploma for high form and breeding.

[Mr. John Yewdall, of West Philadelphia, shows a very beautiful and excellent cow named Fidelia. The favorable comments she receives from cattle fanciers, proves her to be above the average. T.]

Mr. John I. Bishop, of Bordentown, New Jersey, whose herd contains some of the finest specimens of the breed in the State, has brought with him a beautiful young heifer, Mignonne, which is very much admired.

Mr. William Massey, of Philadelphia, has in the bull Lord Byron's Son, over five years old; cows, Gypsey Maid, over two years old, and Gevendolen, over three, and a number of young heifers, an exhibit of Jersey stock, which, for form and breeding, is unexceptionable.

In the collection of Guernseys, Silas Betts of Camden, New Jersey, has some well-bred ones, including the Cow Duchess, fourteen years; Beauty of Bloomfield II, three years; Little Nell, three years; Guernsey Lilly, three years, and the bull Albemarle, two years. The other exhibitors of Guernseys, are James Logan Fisher, Crescentville, Philadelphia, who has two valuable cows in imported Queenie, and Lady Fancy, and bull Young Duke; and Henry Palmer, of Chester, with three excellent representatives in the bull Jeweller, two years old, sire Champion, dam Worthy Beauty, and imported cows Daisy and Bruce.

GROUP III.—Sheep.

The most prominent sheep on exhibition are the Spanish merinos, or what are known as the pure descendants of the Humphrey importation. These sheep were first brought to this country in 1802 by Colonel Humphrey, who was then acting in an official capacity for the United States Government in Spain. The breeding of merinos is exclusively for their wool, which is of the finest fiber. A perfect merino, to be registered, should possess eighty-one points, prominent among which should be an authenticated line of ancestry extending to one or more importations of fine wool merino sheep from Spain, without admixture of any other blood, a good constitution, expanded nostrils, short, strong neck, deep chest, round barrel, strong back and loin, heavy bone of fine texture, muscle fine and firm, skin thick, soft, and of a pink color; the fleece of an evenness and extending over the whole body; in fact, their general appearance should be good carriage, bold, vigorous style, symmetrical form and proper complexion of the covering.

Among the exhibitors of merinos are James Glass, of Burgettstown, Washington county, Pennsylvania, who has six pens of excellent quality of sheep. The most prominent are four rams, over two years old; three ewes, over two years, and a pen of three ewe lambs. W. L. Archer, of Burgettstown, Pennsylvania, has also a good display of merinos, comprising a ram between one and two years old, a ram over two years old, and pens of ewes and ewe lambs that are much admired for their conformation and covering. Alexander McCalmont, of Hickory, Pennsylvania, has also several fine representatives of the merino breed.

Of the Cotswold collection, so called from the large tract of downs in Gloucestershire, England, Jason Sexton, a prominent sheep feeder and dealer in butchers' supplies, at Spring-House, Montgomery county, has several pens that are filled with choice and excellent material, and their general good looks are particularly admired by visitors. E. Hicks, Goshenville, Pennsylvania, exhibits a number of pens of the Cotswold breed that are exceedingly good looking.

The Southdowns, a light fleeced sheep, that originated in the south of England, and are bred particularly for mutton, are well represented by collections of Thomas Shissler, of the House of Correction, Philadelphia; J. B. Baker, "Ingleside Stock Farm," Thorndale, Pennsylvania; Heulings Lippincott, Cinnaminson, New Jersey; Dr. J. Chester Morris, near West Chester, Pennsylvania; Samuel J. Sharpless, Philadelphia, and John Kunkel, with an ewe, three and a half years old, with five legs, the extra leg appearing on the left side, right behind the shoulder.

Oxforddowns are a distinct breed, being a cross between the Southdowns and other breeds. They are bred for mutton, and are generally larger than the Southdowns. Some of the representatives of this breed are from the stock farms of Mr. Samuel J. Sharpless and of Mr. T. S. Cooper, Coopersburg, Pennsylvania.

John Patterson, Glenmore, Pennsylvania, has a fine display of Leicesters, and J. B. Baker, Thornedale, Pennsylvania, and F. C. Wade, have good representations of Lincolns. The Lincoln breed are noted for the fineness and weight of fleece, hardiness, and vitality. They differ from the Leicester breed very materially, having shorter legs and no wool on legs and forehead. They are more compact than the Cotswold, their legs are not more than half as long, and they do not require as much attention at time of dropping their lambs. They are more hardy and will shear equally as much wool and very much finer.

F. Y. Clopper, Greensburg, Pennsylvania, exhibits several pens of buck lambs and ewes, and C. Work, Buffalo, Washington county, Pennsylvania, has an imported ram, and five of his get—three ewes over two years of age, one ewe over one year old, and a ewe lamb.

GROUP IV.—SWINE.

Among the most prominent bred pigs the Chester Whites are the most noticeable. This breed has its origin in a cross between the original hog of thirty years ago and the Yorkshire. The Chester White of the present period, however, is a distinct breed, and it is invariably white in color. The perfect Chester White hog is not coarse nor overgrown; he will mature at early age. His breadth is uniform; he has fine length, broad, straight back, and uniform width from back of ears to setting on of tail; deep through the chine to brisket, which is fine and broad, giving width between the fore legs; hams full and round, running well down to the hock; legs round, and short below the knee; head small, wide between the eyes, dish face, thin, small ear, drooping at the points; hair fine and straight; fine but solid bone, enabling them to carry their great weight without breaking down.

T. Walter & Sons, LaGrange stock farm, West Chester, Pennsylvania, have an excellent assortment of Chester Whites, including a boar weighing one thousand pounds, and a sow, three years old, weighing eight hundred pounds. George Ashbridge, East Goshen, Chester county, Pennsylvania; Thomas Shissler, House of Correction, Philadelphia, and Cloud & Sons, Kennet Square, Delaware county, also make a fine display of this particular breed.

Berkshires are the great favorites of the black breeds of swine. They are renowned for their fine, juicy hams; but will not produce the amount of lard, in proportion to their weight, netted by a Chester White. For family use, and home consumption, it is a desirable hog to possess. In markings, the Berkshire breed should be entirely black, with white on legs to first joint, white splashes on face, and white on tip of tail. As a rule they have good growth.

T. Walter & Sons, LaGrange farm, West Chester, Pennsylvania, show a good collection, comprising three sows five months old, three boars eight months old, and a pen of nine pigs four months old. T. S. Cooper, Linden Grove stock farm, Coopersburg, Pennsylvania, has a large exhibit of Berkshires, the most attractive being a three-year old boar, two imported sows a year old, and a boar one year and six months old. David H. Branson, Coatesville, Pennsylvania, has a boar that is not fairly marked; but very little white about the face, while the tail is black; yet, withal, the general appearance of the hog plainly shows the Berkshire breeding.

Yorkshires are among the most popular breed in England, and it is said that no animal of the pig species carries so great a proportion of flesh to the quantity of bone, or flesh of as fine quality as the small Yorkshire. In power of assimilation, perfection of form, and quietness of disposition, it excells all other breeds. The peculiarities of the Yorkshires are their short leg, deep body, width between eyes, curl nose, scaly skin. They also mature early, and take on flesh very rapidly.

In this department, Mr. W. H. Cole, of Clinton, Hunterdon county, New Jersey, has an excellent selection. The Duke of Yorkshire, bred in England, and imported in 1870, has all the qualifications of a fine bred Yorkshire. He is a regular prize-taker, capturing the first prize at the Royal Show, England, in 1871, for the best pig under one year, and every succeeding year up to the present time he has won a prize wherever exhibited. Among the rest of Mr. Cole's collection are Forest Boy, which cost Mr. Cole £100; imported King William, imported Ellsmere's Duke, bred by Mr. Cole, and a number of other foreign and native bred.

Essex swine are a solid, black breed, with fine hair, and they are particularly noted for the hardships they can endure. Of this breed, J. S. Giles, Apalachia, Tioga county, New York, has the only collection, and they are of an unusually fine quality. Clark Pettit, Salem, New Jersey, exhibits a Jersey red boar, fifteen months old, which is a particular breed in that State. Thomas Shissler, House of Correction, has a couple of pens of a cross between the Jersey Red and Chester White. One pen are entirely white, while the other has red markings on ears and body.

GROUP V.—POULTRY AND PET QUADRUPEDS.

In the collection at the easternmost end of the building are grouped several hundred high-bred fowls, which make their presence known by a succession of high-toned and defiant crowings upon the part of the chicks of spurs and combs. There are about two hundred coops of chickens and fifty of pigeons, with a small representation of the web-footed geese and ducks, and the turkey tribes.

As all mankind have an interest in fowls, particularly when they are garnished for the table, the State fair offers a study of the feathered tribe deserving of more than superficial inspection. Here are presented all those of the finer breeds which poulterers cultivate either as producers of eggs or as the center piece of the table. Like all other creatures of nature, all the best qualities are not centered in one species. Those that excel in the production of eggs are rarely first class post-mortem subjects for basting or roasting, and *vice versa*. In the game fowl, that pugnacious cock of the walk, perfection is most nearly reached. They are of good size and tender, and the hens are attentive to their business; but the penchant of the roosters for pitched battles and unprovoked assaults precludes the possibility of cultivating them in large numbers.

The larger species of chickens, like all the grosser creatures of nature, are coarse and their meat tough and stringy. These, therefore, are fruitful and are good on the lay. The medium sized species, that look so well on the table, and are so tender and tempting, are not much for their fruits, and hence it is that by a wise dispensation a happy balance is maintained.

Among the rare birds of this collection is a pair of South American wild turkeys, exhibited by Mr. J. E. Diehl, of Beverly, New Jersey, who is the superintendent of the department. These are the only birds of the species ever exhibited in the State, and excite considerable attention. They were brought from the wilds of Dom Pedro's domains in Brazil, and are a queer-looking pair. In general appearance they are not unlike the guinea fowl, though much larger than that noisy little creature. Their plumage is almost sable in its blackness, with an almost indefinable luster here and there that gives them a sleek and rich appearance. The eye, ever wakeful, is like a large black bead, set close behind a beak that excels all other beaks for size and color. This appendage resembles a big lump of soft red wax and forms a marked contrast with the unmarked plumage of black.

They seem contented in their close quarters, and appear to regard the attentions shown them as just and proper to strangers in a strange land and their first appearance in public.

The same gentleman exhibits for the first time in this country a trio of domesticated Malay fowls. The hens are not much for style. They are medium sized, are covered with dingy brown feathers, while the roosters are gotten up in a plumage very attractive for a rooster. They are polygamists in their proclivities, but according to the proprieties of the Malay chicken, two wives are sufficient for one lord; and in view of this fact it is never necessary to increase the broods in a greater proportion than this.

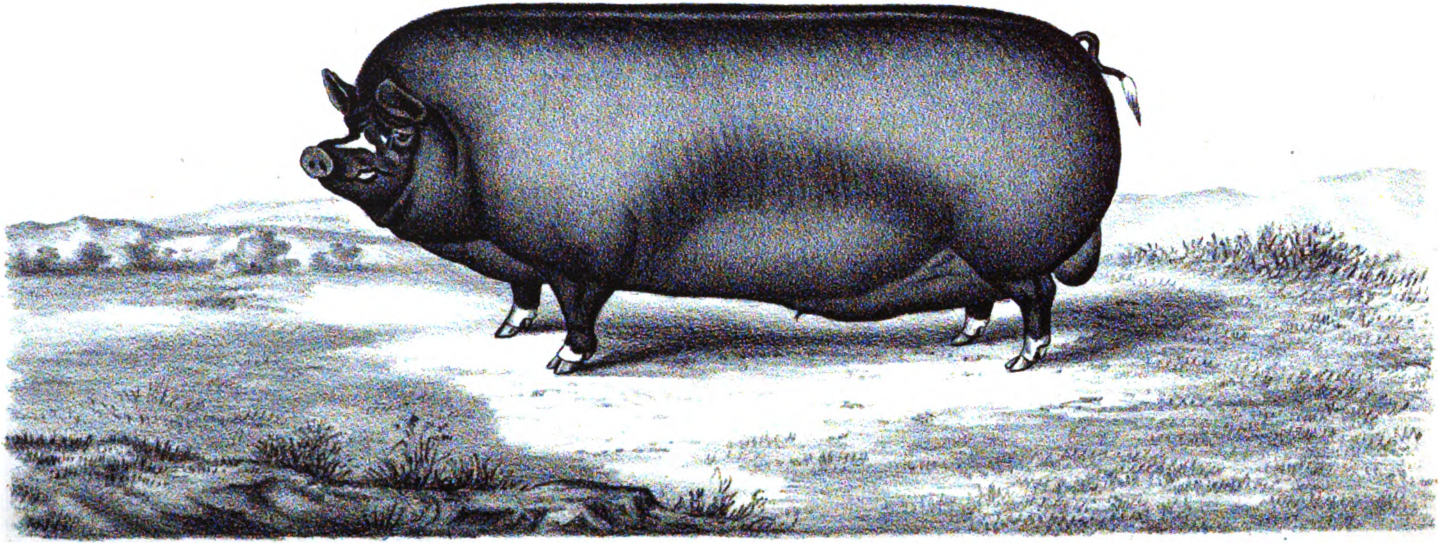
A pair of golden pheasants, exhibited by Mr. J. W. Rooke, of Hestonville, are birds that excite remark, and cause quick, little ejaculations of admiration from the ladies. The male bird is a diminutive specimen, with a lofty stride, but he is covered with a suit of feathers that backs up his style. With a breast of warm red and a top-knot of soft yellow and a speckled back and a regular plume tail, that sweeps gracefully a foot astern, he walks about on his sleek yellow legs, conscious of his beauty. His consort is a plain, little body, like a down east housewife, in a neat suit of brown, speckled feathers, and appears to be entirely satisfied with her lord, and shares the general admiration of his general get up. Adjoining these is a brace of silver pheasants, with black breasts and an upper coating of white feathers, delicately traced with black. They are pretty birds, and are rare, but their brothers and sisters with the "golden" prefixed to their name outshine them too much for excessive laudation.

There are several coops of white-crested black Polands in the collection, entered by Mr. E. J. Chandler, of Kennett Square, and Wilson Barnard, of this city. They are medium-sized fowls, with a glossy black coat and a gorgeous plume of white, mounted on the crown of their heads like a military cockade. It is very apparent that the birds are conscious of their peculiar embellishment, which they every moment toss coquettishly, not unlike a society miss flirting her top-knot when feeling particularly well dressed. In proximity to these are to be seen several speckled and plumed Polanders of excellent breed. The big species are in one group, and these form the principal part of the collection.

There are many coops of white, black, and brown Leghorns, generally in families of three. An imposing family is this of the Leghorns, and it is apparent that those who delight in the breeding of fancy chickens regard this family with considerable favor. There is also a liberal representation of the Andalusian family, which nature has provided with plumage the shade of which resembles that of the dove. They are medium sized and a trim bird.

All the Asiatic family, like their sisters, cousins, and aunts of other breeds, are grouped according to the shade of their plumage. They are all representative members of their tribe, and are therefore to be regarded as the influential chicks of the sections from which they come. Mr. J. R. Giles, of Tioga county, and W. H. Beatty, of Beverly, make the largest exhibit of these birds. Buff Cochin fowls, which belong to the big family, are numerously represented.

Golden-speckled Hamburgs and golden-penciled Hamburgs, a largely developed and beautifully plumed bird, are numerous. There are several groups of Plymouth Rock breed, which are wonderfully and artistically speckled.. In the words of a critical breeder, those Plymouth Rock birds on exhibition, however, are not all blue-blooded. There is a suggestion of feathers on the leathery legs of several, a mark which is said to denote a mixture



Berkshire Boar

"HILLSMERE"

Imported and owned by T. S. Cooper, Coopersburg, Pa.

FIRST PRIZE PENNSYLVANIA STATE FAIR, PHILADELPHIA 1879.

with another breed of low degree. A feather-legged Plymouth Rock, therefore, is tabooed in the society of bird fanciers.

Besides its inherent pugnacity, the male Game chicken is a lofty bird, and backs up his carriage with a big pair of spurs, and a bill that is never presented without effect. He is largely represented in the exhibition, and struts about his quiet looking consorts with an imperious stride. The specimens exhibited are all pronounced to be excellent, and they form one of the principal features of this really good exhibit.

The Bantam family, the lilliputians of the chicken world, are represented as fully as their big relatives. The males crow as defiantly as their big brothers, and strut among the females with just as apparent a sense of their superiority. The black-breasted and red game Bantams, the gold and silver seabright Bantams, and the speckled and tufted Bantams, are there as large as life and full of fuss and feathers.

There is a very limited delegation of the turkey and geese families present. What they lack in numbers, however, they make up in size, and it takes considerable time to go over all that are exhibited. A pair of bronze Holland turkeys, as large as turkeys ever grow, two big white Toulouse geese, and a brace of Bremen geese, are the weighty representatives of their respective lines. Those who can, in imagination, transform these live specimens into baked specimens, can find much food for contemplation in viewing them. In this family of the web-footed tribe is one solitary red-legged Peruvian goose, who meditates upon one leg and seems very lonesome. He or she looks like an ordinary duck on short red stilts, and is not only a rare specimen, but a rare bird in this latitude. He or she is in close company with the white-crested Poland ducks, who are distinguished by a topknot highly ornamental. These are neighbors to the Aylesbury ducks, and the Muscovy ducks, and the Roen ducks, and Pekin ducks, all members of highly bred and blue-blooded breeds.

Then follows the pigeon family in all its distinctive species, that coo and strut and spread amazingly. Some Guinea fowls are exhibited, but only in few numbers. This season of the year is not an opportune one for the exhibition of fowls. It is about the time when old birds begin to moult, and is rather too early for the chicks to be in fine feather. They are not as sleek and trim as they should be, and for this reason many who would at other times have entered their choice fowls have withheld them.

GROUP VI.—INDUSTRIAL INSECTS.

To learn how "the little busy bees improve each shining hour," the visitor must meander down the south aisle, midway from the transept, and investigate the exhibit of T. F. Wiltman, of Camden. Here are located several hives of an improved kind, where a colony of Italian bees is busily engaged in storing up honey for the market. Outside of the interest in watching the bees filling up the honeycombs, there is a study in the improvements made by which this work is accelerated.

Of recent years the storekeepers have had for sale neat little cases of honey with glass sides, each containing about a pound of the sweets extracted from the flowery kingdom, by the diligent insect with the splinter in his tail. These cases and combs are all prepared beforehand, and all the bee has to do is to proceed and store them with honey. The old wax is run through a roller into a thin sheet, so thin as to be almost transparent and about four inches square. These sheets are stamped all over with the slightest impression, and are then suspended in a frame covered with glass and are placed in layers in the hive. By this method the bees are saved the labor of preparing the wax for the base of the comb, and have only to draw out the little cells which have already been prepared for them. This saves them about one half the labor which they heretofore had to perform. In the hives on exhibition they can be seen forming the wax into cells and filling them constantly with honey. A flat and narrow board tubing connects with the bottom of the hives and extends through the walls of the structure to the outside of the buildings. In the adjacent fields the colony goes in quest of sweets, and when each little body gets its load it returns to the narrow way that leads to the store-house. When the first tier of combs is filled, a small tin lamp, with a spout on the top, is filled with cotton, which is ignited. This creates a great smoke, which is forced out of the spout into the hive, thus driving the insects down into the lower course of cells. When this is done the combs that are filled with honey are removed, and a new frame ready for work is substituted. Thus it is that the work goes constantly on. The same exhibitor has a "bee protector," which is a gauze covering that fits over the head to protect the attendant while working among the busy and vindictive insects. There is but one other exhibit relating to bees, and this is a patent hive at the western end of the building.

DEPARTMENT II.—Forest, Farm, and Garden Products and their Derivatives.

GROUP IX.—THE DAIRY.

[The principal centers of attraction in Department II, were the Butter and cheese factories in the Egyptian court, and the Fruits and flowers in the Turkish court and its vicinity. The latter display was of surpassing beauty, but that of the dairy had the charm of novelty and utility, which drew around it the thrifty housewife and dairy woman, the stock breeder, the mechanician, the produce merchant, the lover of agricultural progress, and the student of coöperative industry. It was the first time that the people of Philadelphia had had an opportunity to see the application of steam power to the manufacture of butter and cheese, and the management of the fair had provided most liberally for their gratification. The machinery in operation was equal in size and appointments to that in practical use in the best dairy districts of the Union, and two thousand quarts of milk and one hundred quarts of cream of excellent quality were brought every morning from the adjoining counties to be converted into butter and cheese.

Two complete sets of machinery were in operation—one exhibited by Jones & Faulkner, Utica, New York, the well known manufacturers of dairy supplies. The other by J. B. Marquis, of Norwich, New York, and the Quakertown, Pennsylvania, Dairymens' Association. The machines differ chiefly in the application of the means of cooling and heating the milk and cream. The Marquis machine consists: 1, of the can in which the fresh milk is weighed; 2, of the fresh milk vats in which the cream rises; 3, of the butter making vessels proper, consisting of the cream vat, in which the cream stands until ready for churning, the churn, butter worker, and moulds; 4, the cheese making vessels, consisting of skimmed milk vats, curd drain, and cheese press.

The milk as received from the dairy is weighed in a tared can, and poured and strained into the fresh-milk vats, where it is cooled by pipes through which cold water passes, until it reaches the temperature of forty-five degrees Fahrenheit, at which point it is retained while the cream rises. The vats are of tin, nearly semi-cylindrical in shape, about nine feet long, two and a half feet wide, the milk, when set, being in its greatest depth about twenty inches. The vats are supported on frames, the legs of which stand on a raised platform about as high as the eye of the workman, who observes, through a piece of plate glass inserted into the end toward him, the thickness of the cream. The cooling pipes, of which there are two to each vat, are straight tin cylinders, suspended horizontally in the milk just below its surface, and extending nearly from end to end. They admit of being raised and lowered, and are attached to the reservoir of cold water by flexible tubes. As the milk near the surface is cooled by the pipes it becomes more dense and sinks, its place being supplied by the warm milk. A current is thereby created which so facilitates the rising of the cream that but three hours are required for the purpose. That end of the vat into which the glass plate is fitted is slightly lower than the other, and below the plate a faucet is fastened by which the milk is gradually drawn off, until the cream is seen, through the glass, to rest upon the bottom. The milk runs by a spout into the skimmed-milk vat, which is equal in capacity to two of the fresh-milk vats, and similar in material and shape. It has but one horizontal tin pipe suspended on it, but this is connected by rubber tubing with the boiler of the steam engine which drives the churn, pumps water, &c., and is thus made to heat the contents of the vat to the proper temperature, eighty-two degrees Fahrenheit. The heating effect of the steam pipe is hastened by means of levers, driven by power, which alternately draw the suspending cords of the pipe so as to give it a lateral to and fro motion. In about an hour the skimmed milk is raised to the temperature just named, when the rennet is added. The curd which forms is broken by the motion of the pipe, and the temperature of the mass is raised to ninety-four degrees Fahrenheit, and so kept until the curd is "cooked." To free it from the whey it is frequently cut crosswise with a knife of six long parallel blades. By means of a faucet, the whey is drawn off into a tank set in the cellar, and provided with a pump. The curd is removed to the curd-drain, a quadrangular box, with a false bottom, composed of slats like a screen. Upon these a cloth is laid to receive the curd, which is here allowed to drain until sufficiently dry to be salted, made up into cheese, and put in the gang press.

The cream left in the vats when the skimmed milk was drawn off is removed to the cream vat, which is of tin, and like the others in shape, but smaller. Like them it also has its suspended horizontal tin pipe to regulate the temperature of its contents, which is maintained at sixty degrees Fahrenheit for twenty-four hours. At the end of that time the cream, which has become very slightly sour, is churned, the buttermilk is drawn off into the same tank with the whey, and the butter, still in the churn, well washed by means of a hose. It is then removed to the butter worker, washed and salted, allowed to stand over night, the next day worked twice, and moulded.

In co-operative dairy practice, the "patrons" who bring their milk in the morning return with their cans filled with the mixed whey and buttermilk for their pigs, so that there is no accumulation of waste round the factory.

A. L. K.]

Faulkner & Jones use unskimmed milk in their cheese factory. The milk is poured into what is termed a cheese vat, which holds six hundred gallons of unskimmed milk. The milk is then heated to a temperature of eighty-five degrees. When this is accomplished a vegetable extract or coloring matter is introduced and thoroughly mixed with the milk. Then enough extract of rennet is put in to thicken the milk and make it one solid mass. This requires about an hour's time. Horizontal and perpendicular knives are then used to cut it up into small cubes. After it is cut up, it is again heated gradually to a temperature of ninety-two degrees, after which it is allowed to stand for fifteen or twenty minutes. The heating process is finished when it reaches ninety-eight degrees. The heating is all done by an application of dry steam, which is introduced into compartments or pipes running around the vat. The heat is kept at ninety-eight degrees until the curd is thoroughly cooked, so that the whey will all be expelled in the pressing, which takes place afterwards. A portion of the whey is then drawn off until a little acid can be detected. This is accomplished by holding some of the curd, with the whey squeezed out, against an iron nearly red hot, when, if there is sufficient acid, the curd will string out about two inches. All the whey is then drawn off and the curd packed in a solid mass at the bottom of the vat. It is then cut into square chunks and packed along the sides of the vat. The curd is then transferred to the curd sink, where it is broken up into very small pieces by the curd-mill. The salt is put in at the rate of two and a quarter pounds to each one hundred pounds of cheese. After allowing it to air and cool for a time, it is placed in a gang-press, about four o'clock in the afternoon, where it remains until the next day. Having been pressed into shape for market, the cheese is taken out and the ends greased, after which it is ranged on shelves, and turned every day for two or three weeks, when it is ready for market. The work of making the cheese is commenced about eight o'clock in the morning and finished about four in the afternoon. They are now using about two hundred and fifty gallons of milk a day.

Near this is an improved rotary churn, arranged with air tubes, through which oxygen may be injected into the butter while forming, making it solid and sweet and enhancing its keeping qualities. Among the special features of this appliance is the action of the arms of the dash, which are so arranged that the bevels of one row throw the cream to the right, while those of the next row reverse the action, and cause what may be termed a double-force action. By this means the globules are quickly broken and the butter is formed in about one half of the usual time. Besides this the butter can be washed, salted, and thoroughly worked without removing it from the churn, and by the turning of a nut the dash can be removed and the churn cleansed without trouble.

Of the butter-working machines, one, the Lilly, is so constructed that the butter does not come in contact with any metal. A revolving ladle works as nearly like the hand as possible, forming ridges, and then diagonally crossing them at every revolution of the tub, thus mixing the salt thoroughly and allowing the buttermilk to escape to the center.

The "Reid" worker consists of a tray and a roller with paddles, which is turned by a crank, and travels from one end of the tray to another. It acts upon the butter on precisely the same principle as a ladle in the human hand, but with perfect uniformity.

Another feature of the dairy utensil section of the fair is a bureau creamery and refrigerator. This apparatus consists of an upright bureau made of thoroughly seasoned spruce lumber. In the upper part is a rack for holding a supply of ice and a metallic pan with rubber tube attached, by which the waste water is carried away. Below this rack are four large milk pans, with sufficient space around each to admit of the free circulation of cold air from the ice above. The pans stand on rests, and may be drawn out of the bureau at will. Below the pans is a closet for cream or butter, having a capacity for several tubs. Each end of the bureau is supplied with four ventilators, which keep out insects and dirt, and also control the temperature and circulation of air in the interior. The advantages claimed for this invention are that an even temperature is secured for the setting of the milk, that during the prevalence of a thunder-storms the milk is kept sweet until every particle of cream is raised, that the uniform and correct temperature insures a better quality to the butter, and that it requires but little labor. With this exhibit are some improved butter tubs with removable ice chambers and coolers.

What is known as the "Cooley" system of raising cream is on exhibition in the dairy section. Cans of milk, holding about seventeen quarts, are submerged in a portable creamer filled with water of a temperature of from forty-five to forty-eight degrees. Cream is obtained in from three to four hours, and the milk is then drawn by a valve at the bottom. Through a strip of glass inserted into the side of the can the thickness of the cream can be observed.

Nineteen out of the twenty cheese factories in Crawford county were represented by one hundred and four full-milk cheeses, weighing in the aggregate sixty-four hundred pounds.

GROUP XIII.—Oils, Fats, and Soaps.

The display of articles coming within the catagory of oils, fats, and soaps is but passably fair. H. S. Zugler & Co. show a case of paste stove polish and shoe blacking. Joseph Dixon Crucible Company, of Jersey City, has specimens of axle grease. M. L. Shoemaker & Co. show animal and vegetable oils. J. P. Naphey's Sons have a pavilion filled with bottles and cases containing lard and lard oils. E. S. Morris & Co. show sweet palm oil, palm kernel oil, and palm soaps. John W. Wetmore, Lancaster county, has an exhibit of axle lubricator.

In the perfumery department there are five exhibits, embracing all the popular extracts J. F. Pettit & Co., Bean & Bros., Hambleton & Sons. Malcom & Stevenson, G. T. Servis, Menzies & Co., Laler Bros. have collections of baking powders, butter colors, and flavoring extracts.

All varieties of fancy and laundry soaps are represented in exhibits from Eastman & Bros., William Conway, G. Dreydropped, Bean & Bros., J. Hambleton. Mrs. S. L. Wills, Philadelphia, has an exhibit of home-made soaps.

GROUP XV.—Grain and Seed.

The largest collection of grain is that of the Cumberland County Agricultural and Horticultural Society, which sends some fifty bags, comprising five varieties of oats, two of barley, twenty of wheat, two of rye, three of yellow corn, two of white corn, and one variety each of clover and timothy seeds. They have, also, samples of each of the grains in the ear. J. Galbraith, of Cumberland county, sends a special exhibit of his grain crop, included in which are samples of Washington grass and gold dust wheat, and Oregon rye. His entire crops of these varieties have been purchased by the Commissioner of Agriculture for the purpose of distributing samples among the farmers of the country. In this exhibit, also, are five stalks of corn, twelve feet in height, which were raised from a single grain. The stalks contain ten ears of corn.

The Solebury Farmers' Club includes in its exhibit thirty bags of wheat, and barley. The Factoryville Farmers' Club has a bag of cucumber seed, and samples of yellow corn. W. H. Jones, 1621 Market street, Philadelphia, has a pavilion crowded with one hundred cases, containing all kinds of vegetable and flower seeds, in addition to fifty bags of grain of all varieties. Henry A. Dreer shows a pyramid of glass cases, filled with seeds, surmounted with numerous specimens of dried grasses.

Thousands of bushels of grain grown in southeastern Missouri and central Arkansas are shipped yearly to England and the Continent from the port of Philadelphia. The St. Louis and Iron Montain railroad has an exhibit at the fair in the shape of some fifty glass cases filled with specimens of the wheat, corn, and oats produced in the two States.

GROUP XVI.—FLOUR, MEAL, AND THEIR PRODUCTS.

Flour, meal, and their products are largely represented in the northwest section of the building. One barrel of flour, two boxes of corn, one of hominy, and a number of packages of maizine come from the Solebury Farmers' Club. A. A. Taylor, of Loudonville, sends nine barrels and six sacks of flour. Farrel & Co., of New York, fill a case with Irish and Scotch oatmeal in barrels, tins, and packages. Prentzel, Philadelphia, exhibits pearl and yellow hominy and grits. There are two large exhibits of starch by Johnson, of Philadelphia, and Kingsford, of Oswego, New York. In the old wind-mill house George V. Hecker & Co., Philadelphia, exhibit samples of self-raising griddle cake and buckwheat flours; farina, which is brought into use for dyspeptics, and self-raising biscuit and plain superlative flours. They also show a barrel of self-raising superlative flour, which took the only prize awarded to American flour at the first world's fair, held in London in 1851, when American products were not so well known in England as they are to-day. Four thousand griddle cakes and as many fancy cakes are made at this exhibit daily, and presented hot from the stove to the hundreds who crowd around to view the process.

The experts to whom the labor of passing upon the merits of the different flours on exhibition was assigned performed this duty well. To guard against the interruption of a curious crowd, they trudged up stairs to a corner of the press gallery, each laden with sample bags of Minnesota patent, Brice's Peerless, Gazelle Patent Premier, St. Louis patent, Aleshire Family, Empire Goodrich's patent, Washburne's Superlative, and other brands. About a pound of each variety was deposited in a little heap on a table, and then, first divesting themselves of coats, and rolling back shirt sleeves, the pair went to work, with the aid of a bucket of water, to make a couple of dough balls out of each sample for the purpose of testing the grade of the flour. This done, the balls were allowed to stand for a few hours in order to dry out. Some came out white, while others had a yellowish cast, the majority held up and a few settled down. When the judges came back they rolled and twisted and pulled the balls into every conceivable shape, and the judging was over.

Near the flour and meal exhibits is a section where the little boys and girls love to congregate. Here are displayed the various uses for which flour may be employed in the shape of almost every known variety of fancy cakes and nicknacks, which make the eyes of the youngsters sparkle with longing desires. The exhibitors are Walter G. Wilson & Co., who have two hundred and fifty varieties, including charcoal crackers for dyspeptics and the champion dwarf cracker, no longer than the top of a finger. A. Exton, of Trenton, exhibits oyster, water, wine, and butter crackers; C. L. Scott, cocoanut, macaronies, and fancy cakes; D. B. Fuller, aerated biscuits; David Carrick, crackers and biscuits. John Hartman, of Philadelphia, shows specimens of what our soldiers and sailors eat in the way of biscuits.

The State fair management offers a diploma for the best five loaves of bakers' bread, but, notwithstanding the number of flour manipulators in Philadelphia, only one has responded. This is G. Byron Morse, who has on exhibition two loaves of cream bread; two of bran; one of steam cream; a Vienna roll, weighing four pounds; and a number of breakfast, Vienna, and Saratoga rolls. His exhibition also includes a collection of pastry and fancy cakes.

GROUP XVII.—SUGARS AND CONFECTIONS.

This branch of industry is represented by Frank R. Buck, Jenkins & Craig, Croft, Wilbur & Co., and the Philadelphia Confectionery Company, all of whom show a large assortment of the sweet morsels which gladden the youthful palate. The art of manufacturing sweets is shown at Frank R. Buck's exhibit, where a couple of workmen, in white aprons and caps, can be seen all day long pulling and stretching out yard after yard of molasses candy, and turning out every variety of confectionery from gum drops to chocolate creams.

The exhibit of honey is small. J. J. Williamson, Brandywine Summit, Delaware county, has two cases of honey in comb. J. G. Calvert, Newtown, Delaware county, shows five pounds of extracted honey. T. F. Wiltman, Camden, shows honey both in combs and extracted. Twenty jars of extracted honey find a place among the exhibits of the Cumberland County Agricultural and Horticultural Society.

GROUP XVIII.—NARCOTIC AND ACID PRODUCTS.

The display of native WINES is invested with more than ordinary interest in connection with the efforts which are now being made by the French Government to secure a reduction of the tariff on foreign wines and the opposition which this proposal has encountered from the home growers. The exhibit at the fair, although not large, is fully representative. Egg Harbor City, New Jersey, sends a contribution, covering a large proportion of the growers in this thriving place.

Julius Hincke has Catawba bottled in 1868; Franklin, 1870 and 1873; Jersica, 1871, and Tohlink of the vintage of 1873. T. H. Bannihar is represented by his Catawba, Cynthiana, Ruby Claret, Clinton, and Norton Virginia brands. A. Stephany has a few bottles of True America; W. C. Braunbeck several samples of Clareta; T. Furrer, Martha wine, and Augustus Heil & Son's make a display of their Flower of Jersey, White Concord, and Martha.

Side by side with the wines are specimens of the grapes employed in their production.

The Wine Growers' Association of Vineland have a score of bottles of Port, Burgundy, Muscatel, Blackberry, and dry Concord wines.

From the Vine Valley Vineyards, on Canandaigua lake, New York State, which are owned by Mr. T. B. Seeley, a Philadelphian, come a couple dozen bottles of wine made from the Delaware, Iona, and Diana grapes, all of the vintage of 1869. Specimens of the grapes accompany the wines.

The Seneca Lake (New York) Wine Company, whose vineyard, covering upward of four hundred acres, is claimed to be the largest single vineyard in the United States, occupy the Tunisian pavilion with a selection of one dozen specimens of their productions, aggregating upward of one hundred bottles. In the list are ports, sherries, clarets, hocks, brandies, and unfermented wines for communion purposes. The company has also an exhibit of three varieties of champagne.

Adjoining this exhibit is a court occupied by the Napa Wine Company, of California. There are thirty cases of Red Seal, Golden Brand, American Extra Dry, and Continental champagnes, the production of California vineyards. Included in the exhibit are samples of the Angostura Bitters, which come from Trinidad, as well as of Leicestershire (England) Cowslip wine, which takes its name from the fact that it is colored and flavored with an extract of that flower.

Although premiums were offered for the best two gallons each of ale, porter, lager beer, and domestic beer, none of these productions find a place in the fair. The same may be said of home-made wines and cider, and of wine and raspberry vinegars. The process employed in the manufacture of cider is shown in the building by hand and power presses.

To the right of the center aisle, near the eastern end of the building, may be found the only exhibit of leaf TOBACCO. The exhibit is small—so much so as to excite comment. There are half a dozen stalks bearing green leaves arranged on a screen. These were contributed by S. S. Spencer, of Lancaster county. No effort has been made to show the result of cultivation from varieties in seeds, and what could have been made one of the most interesting exhibits in the agricultural department is really the poorest, because of seeming indifference. The tobacco crop is one of the most important in Pennsylvania. There is not a county south of the northern tier in which it is not grown, and the crop last year was estimated at ninety thousand cases. The degree of perfection to which its cultivation has attained in Lancaster and other counties, is well told in the fact that the leaf from these counties is quoted in Bremen and the more important European capitals at higher figures than Connecticut leaf, which is losing its flavor on account of the absorbtion of certain properties of the manures used. No crop planted exhausts soil more quickly than tobacco, and unless stimulated constantly by the free application of fertilizers the soil will soon lose its powers of production. The soil in this State, especially the bottom land—loose and sensitive to impregnation by manures—is finely adapted to the growth of this staple, and, being one of the most profitable crops to which the farmer can turn his attention, it is rapidly increasing in popularity.

The display of manufactured tobacco is to be found near the eastern entrance. George F. Wardle offers smoking and chewing tobacco for inspection, and his space is in representation of a yard which is tiled with plugs of tobacco. A miniature house is also built of the same material. H. Wilkins has an exhibit of bright Virginia tobaccos. Scrover & Cook, of this city, make a good display of virgin leaf. Two specimens are doctored with licorice, ready for exportation. William S. Kimble & Co., of Rochester, make a display of cigarettes and prepared tobacco for light smoking. F. W. Felgner & Son, of Baltimore, show light brands of smoking, including the Virginia popular brands. Marburg Brothers, of Petersburg, Virginia, offer different grades of Virginia smoking, and the Bachelor Brothers have a tempting display of cigars, in which particular attention has been paid to shape and colors. M. E. McDowell & Co., of Philadelphia, exhibit Durham smoking. J. F. Allen & Co., of Richmond, Virginia, make a display of fancy smoking materials—such as cigarettes, prepared fancy tobacco, tinted papers, etc. W. H. Banton, of Philadelphia, shows by the bushel the famous Gold Leaf from Lynchburg. N. B. Manning, of Philadelphia, has a display of cigars and cigarettes, and Joseph Wallace has specialities in snuff.

GROUPS XIX AND XX.—VEGETABLES AND FRUITS.

Two thousand feet of table, stretching down the center aisle from the western entrance, accommodated the vast display of fruits and vegetables. This does not include the many well-filled side tables which occupy the various courts and transepts on either side of the main table. Those who go to this section with the expectation of seeing any monstrosities of the fruit or vegetable kingdom will be disappointed. The exhibits have few special features, the general idea of the exhibitors being, as one of their number expressed it, "to show what we develop season after season, rather than pride ourselves on something which may not come again in a lifetime." As an exhibition, however, of the capabilities of American fields, orchards, and vineyards, the show is a fine one, and, in itself, well worthy of a visit to the building.

The largest exhibit is that of the Cumberland Co. Agricultural and Horticultural Society, which shows about three times the quantity exhibited by any individual or organization in this department. Two hundred of the leading farmers of the county are members of this association, and one half of the number are represented on the table. The Cumberland county men not only grow their fruit, but also dry and can it; and side by side with the ripe rosy fruits are the specimens of this double industry, in the shape of dried and canned peaches, pears, cherries, currants, raspberries, and blackberries. By a patent of their own, these farmers are enabled to pick their fruit from the bushes and trees, and have it dried and boxed ready for home or foreign markets, within four hours. One of their representatives said that this year the whole crop of the trees and bushes of every member of the association was bought up by home grocers and exporters before the fruit was in a condition to pick. One thousand plates are covered with specimens of the fruit of Cumberland county, while on the floor near by are bags and boxes containing over twenty varieties of wheat, as well as one hundred and fifty bushels of rye, corn, oats, barley, and sorghum. Adjoining the fruit table is an exhibit of various vegetables, including some early Vermont potatoes, five inches long, and six in circumference. On a pillar, at one end of the exhibit, are some twenty stalks of tobacco grown in the county, with specimens of the same product cured. To show it has wealth below as well as above the earth, the association winds up its contribution to the fair with two boxes of silver and magnetic ore.

Several pippins, weighing from sixteen to twenty ounces each, are prominent features of the contribution from the Solebury (Bucks county) Farmers' Club. Their table is covered with twelve dozen plates of apples, pears, and peaches of all varieties; twenty bags of timothy seed and grain, and eight baskets of Snowflake, Early Rose, and Peerless potatoes.

Coming nearer home, the House of Correction gives proof of the industry of its inmates in an exhibition of half a bushel of big carrots, and the same quantity of beets, Early Rose potatoes, Lima beans, and several head of exceedingly large cabbage. With the exhibit are a number of tobacco stalks, and several, bags of rye, white amber wheat, and yellow and white seed onions.

The productive nature of the soil in the "Neck," is demonstrated by George D. Field, of Twenty-second and Passyunk avenue, who fills half a large table with fine specimens of almost every vegetable that can be mentioned.

New Jersey shows up well in the group. Vineland, which this year has dispensed with its annual fair in order to participate in the one at the Exhibition, has a hundred-feet table packed with plates of fruit and grapes. There are fifteen varieties of apples, ten of grapes, eight of quinces, and nine of pears. Among the latter are some exceedingly fine specimens of Bartletts and Duchess, one or two of the latter actually measuring twelve inches round. Shiloh, Cumberland county, New Jersey, sends the boss pumpkin, weighing one hundred and fifteen pounds, as well as several stalks of corn, measuring fifteen feet from root to top. The specialty of this exhibit is the New American cantaloupe, an entirely new variety. Some of the specimens on hand measure two and a half feet by fourteen inches in circumference.

The ten members of the Factoryville (Wyoming county) Farmers' Club cover sixty feet of table with specimens of one hundred varieties of potatoes, a mammoth squash, weighing one hundred pounds, some drum-head cabbages fifty inches in circumference, and a small collection of fruits. From Satterthwaite's nurseries, at Abington, are shown five hundred plates of peaches, apples, and grapes. The wine growers of Vine Valley, Canandaigua Lake, New York, send several plates of Delaware, Iona, and Diana grapes grown at that place, and a number of bottles of wine from a cellar which has not been opened for the last nine years.

States as far distant as Arkansas and Missouri have thought it worth while to be represented at the fair. They occupy a table in the Norwegian court, on the corner of the extreme western end of the main aisle. Here they show what their soil is capable of producing in the shape of cereals. A score of glass jars are filled with all kinds of grain, while nailed to posts are stalks of corn, oats, millet, Hungarian grass, and broom corn; the latter being some twenty feet high. With these are specimens of the principal woods of the two States, and iron, galena, ochre, lignite, lead, silver, and other ores and bituminous coal, with a few stalks of dried tobacco.

How the fruits upon which so many thousands depend for their winter desert are dried, is shown in the first aisle south of the main aisle, and west of the dairy. There sits an exhibitor, who, with one turn of a machine, which might be put into an ordinary sized coat pocket, deftly whirls the skin from an apple or a peach. The former are cut in half, and the apples sliced in rings. Wire trays are filled with the fruit, and placed in an inclined flue, which has a furnace at the lower end. Special pains are taken in the construction to prevent the smoke and gas from the fuel finding its way into the fruit flue. The current of hot air, which passes though the latter, dries the fruit, and in a couple of hours the trays are removed and another batch inserted. The process is continued all through the day.

GROUP XXII—ORNAMENTAL PLANTS AND FLOWERS.

It was scarcely necessary for the visitors who were in the western end of the building to inquire as to the location of the floral display. The exhibit was in the Turkish pavilion, one hundred feet long by fiftywide, which it occupied. The flowers perfumed the air far and wide, and served as a guide to those in quest of the department.

The display of plants, which occupies a position in the center of the west half of the main aisle, is unusually fine, and of such a character as to win high encomiums from the judges. A fine collection of ferns, foliage plants, palms, and rare evergreens, comes from the nurseries of R. Buist. John Dick has the largest collection in the section, comprising all varieties of greenhouse plants, palms, foliage plants, and fine specimens of cacti and agave. This collection is mounted on shelves rising in the form of a pyramid. John Sherwood & R. H. Sherwood, have a fine exhibit of ornamental plants in bloom, palms, ferns, and a goodly-sized pineapple growing in a pot. Gibson & Bennett have an exceedingly attractive collection of evergreens in pots, and also of tuberoses. W. H. Moon, of Moonsville, Bucks county, sends a large collection of hardy evergreens, as well as of ornamental, shade, and fruit trees.

Many of the designs shown were as novel as they were effective. John Plender sent a floral chair, resting on a base four feet square, composed of dahlias, the finest flowers entering into the construction of the counterfeit piece of furniture. On the back was the inscription, in purple immortelles, "General Grant's chair." The same firm exhibited a horseshoe, resting on a base, with a cross and crown in the center, and surmounted with a dove, four boquets, a star mounted on a floral bed, and a cross, pillow, and wreath of immortelles.

One of the features which at once attracted attention was a model of the steamship Republic, by John Plender, standing five feet in height and measuring six feet in length. Over ten thousand flowers, rose buds, tube roses, and carnation pinks being in the majority, were employed in its construction. Joseph Kitt & Son exhibited a beehive, standing on a pillar, composed of geraniums, tuberoses, and gladiolus, the hive being made up of white balsams and red geraniums arranged in rings. Above this was a canopy of roses and smilax three feet in diameter.

Pennock Brothers showed a handsome floral column, ten feet in height, surmounted by a lyre, and a representation of a picture frame, twenty by thirty inches. A plow, four feet high, the handles being composed of tea roses, balsams, and carnations, was shown by Craig & Bros. On the side was the inscription, made up with purple immortelles, "Speed the Plow." A model of the old Independence bell, suspended from a floral arch, and the crack being traced with colored immortelles, came from La Roche & Stal's nurseries. Faust & Son were represented by a new funeral design, which took the form of a broken wheel resting on a stubble field. Behind the wheel was a sickle of flowers and a bunch of wheat. In front was the inscription, made with many colored flowers, "The harvest is over."

Theodore P. Warwick exhibited a horseshoe, a funeral cross with anchors suspended on either side and a funeral wreath, the whole making a small but handsome exhibit. Thomas Meehan had a table covered with evergreens, trees, and shrubs. Besides these there were a number of exotics, funeral designs of every conceivable shape, a few bridal bouquets and several cases of seeds.

New Jersey sent only one exhibit to this department, but this was a notable one. It was a funeral casket, standing on a catafalque covered with black cloth. The casket was four feet long and eighteen inches wide at the head. Four thousand flowers, including eighteen hundred carnation pinks, two hundred and fifty tea rose buds, and one hundred feet of immortelles and smilax, went to make up this floral sounterfeit of man's last home. Along the sides the panel work was represented with purple immortelles, and on the top was a cross of white carnations and the inscription in purple flowers: "O death, where is thy sting?" This reminder of death came from the Haddonfield nurseries of C. W. Turnley, of Camden.

THE SUPPLEMENTARY FLOWER SHOW was one of the finest displays of cut flowers which has been seen in Philadelphia for some time.

John M. Hudson was represented by a funeral design, in the form of a frame four and a half feet square, with a background of ivy leaves, and a border of large water lilies, tea roses, tuberoses, and balsams. In the center was a scythe, the handle being of tea roses, to represent the color of wood, and the blade of blossoms, to illustrate steel. In the circle formed by the blade was a minature sheaf of wheat and an hour glass of flowers, composed of bonsaline buds and tea roses. On the upper portion of the frame were the words in immortelles, "The Harvest Gathered." The whole combined to make a striking design.

Pennock Brothers' nurseries were represented on the floor with a design standing some ten feet in height, which might be taken to represent either a bower or a fountain.

Every variety of choice flowers was employed in its construction, and the effect was simply gorgeous.

The exhibit of Peter S. Sheetz comprised a table design in the form of a plateau, a funeral design, an urn composed of balsams, tuberoses, and other flowers, a harp four feet in height, and a floral pillow.

Thomas Robertson showed a table design of a willow-work ship filled with flowers, and supported on a floral bed. La Roche & Stahl also had a ship supported by a large base and pillar, the whole standing several feet high. Eugene Weis exhibited a funeral wreath, W. F. Faust, a cannon, mounted upon a gun carriage, and Ferdinand Le Gierse, a large funeral design consisting of a holly-leaved base eight feet square, a floral block three feet square, and above all a cross three feet high. C. W. Turnley, Camden, had two handsome funeral wreaths, and the same number of pyramid boquets. Theodore P. Warwick had a pillow, anchor, and crown rising above each other.

In every design on exhibition, tuberoses, carnation pinks, tea roses, geraniums, heliotropes, balsams, sweet alysum, and other choice flowers were used in profussion.

A side table was covered with single dahlias, contributed by H. A. Dreer and Gibson & Bennett.

DEPARTMENT III.—Apparel and Household Goods.

By C. Henry Roney, C. E., Superintendent.

Owing to a very general misapprehension that the object of the Society is principally intended to encourage the improvement of live stock and agricultural machinery, the display in Department III was much smaller than was anticipated.

A large number of exhibits in the Main Building, some of which had been entirely renewed for this exhibition, attracted much attention, but were not entered in the Society's display, and consequently were excluded from this notice.

Where processes of manufacture were shown they always attracted much attention. They were, in many cases, a source of much profit to the exhibitors showing the process, and should be encouraged where possible.

GROUP XXIII.—Woven and Felted Fabrics.

W. A. Drown & Co.'s (246, Market street, Philadelphia) exhibit of umbrellas and parasols entirely of domestic manufacture, and, in fact, almost entirely made in this city, deserves notice. The black dyes used, of which they have exclusive control for this purpose, have shown themselves much more permanent than those generally in use, and a decided improvement, over their exhibit in 1876, and at much less cost.

GROUP XXV.—Household Machines.

This group contained some very fine improvements, among them, those of the American Button-hole Company, machines for making button-holes and over-seaming, and a family sewing machine, both of great excellence; and that of the National Sewing Machine Company, "limited," exhibiting a sewing machine attachment for making button-holes, also for over-seaming and ornamental stitching, capable of attachment to any transfer shuttle sewing machine, at low cost, but more particularly applicable to the Singer machine. Among the advantages claimed for it are: That it is the only known machine that will make a *lock-stitch button-hole;* and will work a button-hole either in the lightest or heaviest fabric. (See Fig. 1.)

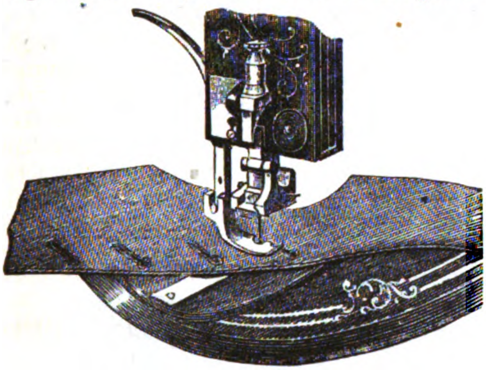


Fig. 1.—One needle working button-hole.

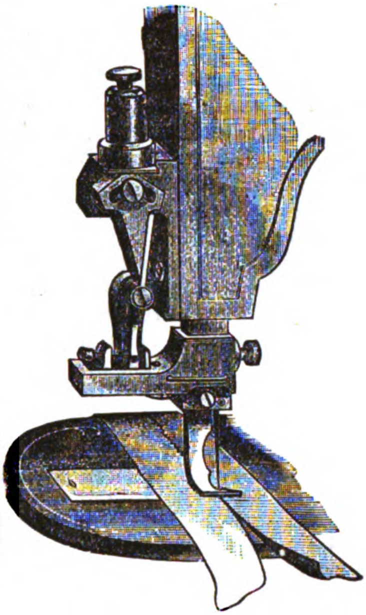


Fig. 2.—One needle seaming.

It is the only button-hole machine or attachment that will work with cotton or thread on any material.

With one needle, it will sew straight, zig-zag, or over-seam, with length of throw at the option of the operator, the length of stitch being varied by the change of the ordinary feed. (Figs. 2 and 3

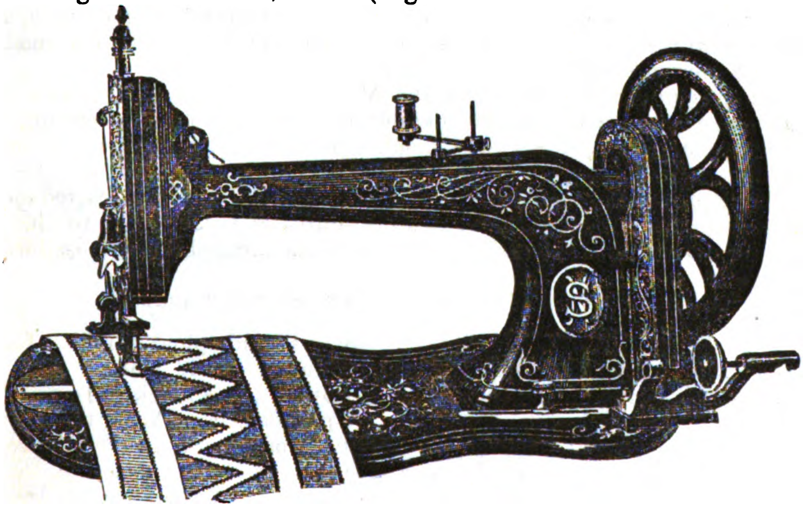


Fig. 3.—One needle sewing on braid.

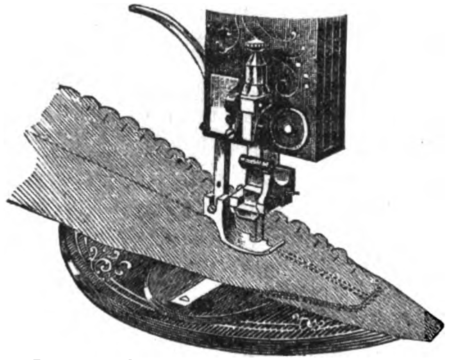


Fig. 4.—Two needles vamping on shoes.

With *two* needles it will seam *straight*, zigzag, or overseam and on vamping shoes, &c., will do the work of two operators. (Figs. 2 and 4.)

The zigzag seam is an elastic lock stitch desirable for sewing textile fabrics. (Figs. 2 and 3.)

With *three* needles it will perform work never before done, making three equi-distant seems simultaneously, thus doing the work of three machines and three operators, and requiring no more skill in the operator than in sewing a single seam.

It will do a variety of ornamental work on dresses, undergarments, slippers, &c., and as each needle can carry a differently colored silk, the most beautifully variegated seaming can be done.

The attachment need not be removed for doing ordinary sewing, it is simple in construction, easily operated, works automatically, is not liable to get out of order, and promises to be a very valuable addition for family use as well as manufacturing purposes.

FRANK J. BOYER, 108 North Seventh street, Philadelphia, exhibits *Gunsalus' Patent Steam Washer, with Boyer's Patent Flange*, a device intended to dispense completely with the wash-board and all manual labor by a current of water on the clothes placed in a boiler and kept circulating by the action of the steam generated when boiling the clothes, the flange preventing the water from boiling over into the fire when the proper quantity of water, soap, and clothes have been placed in the boiler.

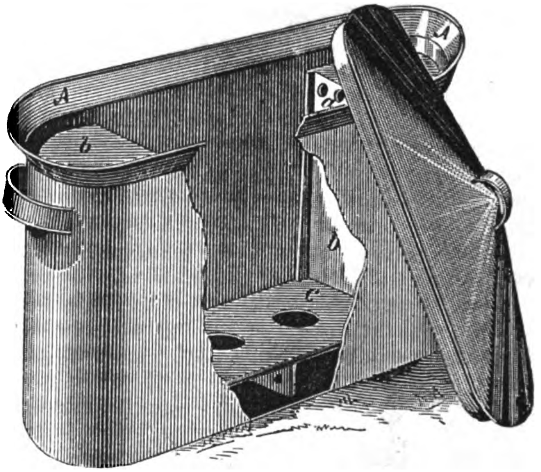


Fig. 5.—Gunsalus' Patent Steam Washer, with Boyer's Patent Flange.

J. S. LASH & CO., Philadelphia, exhibit a *Washing machine and Tub*. This machine is composed of two pieces of castings and a wooden handle one and one quarter inch in diameter and two and one half feet long. The large piece of the castings is galvanized, and weighs about seventeen pounds, and the small piece about four pounds, is in the

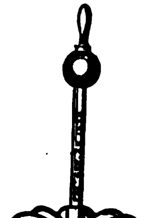


Fig. 6.

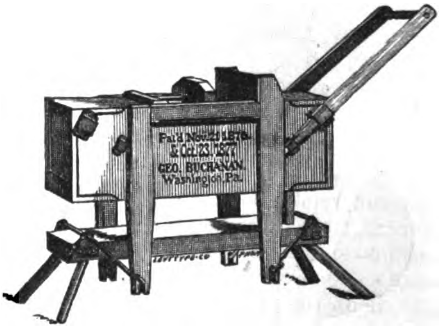


Fig. 7.

shape of a ball. The cut represents the machine ready for use. The washing is done by suction, and forcing the water rapidly through the goods by rotating the handle, (Fig. 6.)

A. C. **COTTON**, Reading, Pennsyvania, exhibited *Buchanan's Patent Washer*, on a different principle. It has an oscillatory motion, with a twenty-five pound perforated block or traveler, running inside, to press the dirt out of the clothes placed in each end of the rocking box, (Fig. 7.)

GROUP XXVI.—TABLE WARE.

The display of sterling silver and electro-silver-plated ware, made by **WILLIAM WILSON & SON**, S. W. corner Fifth and Cherry streets, Philadelphia, was very fine, and embraced presentation vases and setts, also table ware, someof it in repousse work.

Among the objects exhibited by them was a silver-plated ice pitcher with double walls, (Fig. —,) ornamented as well as its salver, with floral emblems in repoussé work. This style of ornament is produced by a tedious process, the figures being hammered up, in relief from the plain surface, with various shaped tools, producing a much more beautiful effect, although more expensive than the plain and chased work, where the figures are engraved on the plain surface, and not in relief.

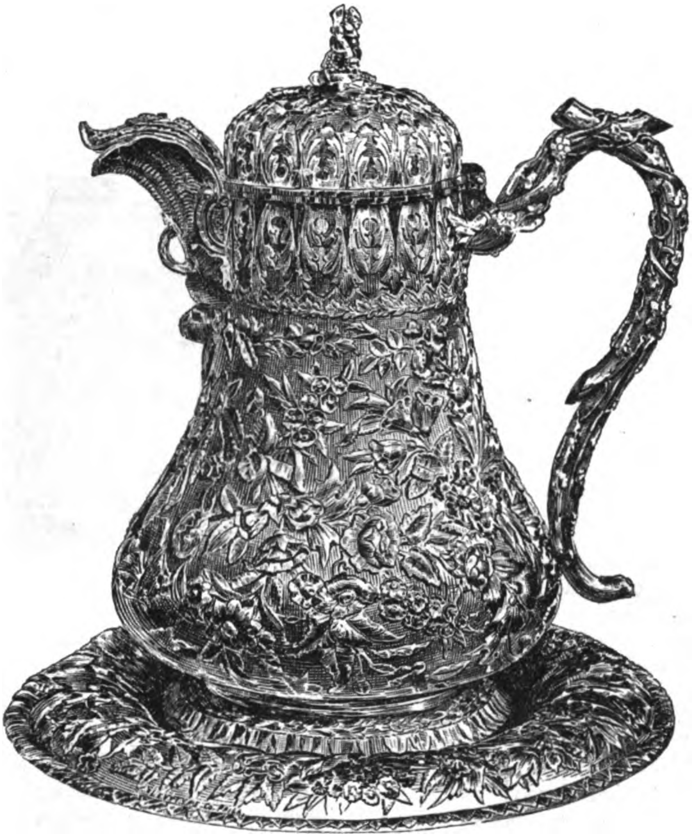


Fig. —. Double-Walled Ice Pitcher.

GILLENDER & SONS, 135 Oxford street, Philadelphia, made a very fine display of *glassware*, showing the process of manufacture.

S. J. MERCHANT, 821 Cherry street, Philadelphia, showed the process of engraving cut and engraved glassware of all descriptions, table ware, druggists' sundries, graduates, and cut glass globes, &c.

HERMAN FOLKERS, 1109 Chestnut street, Philadelphia, exhibited a large collection of *ornamental iridescent and colored glass* vases, ornamented, and other fancy glassware.

CHARLES CONRADT, 224 Vine street, Philadelphia, showed *gilded, silver plated, and bronzed goods*, as well as the process of gilding and silvering.

A. LEDIG & SON, 248 North Eighth street, Philadelphia, made a good display of *silver plated ware.*

GROUP XXVII.—HOUSEHOLD FURNITURE.

The superb collection of furniture, carpets, upholstery, &c., now in the Centennial building, forms part of the Permanent Exhibition, and was not entered on the books of the State Fair, all description of it is therefore necessarily omitted.

JOSEPH J. RAY, 812 Market street, Philadelphia, exhibited the "*Sanitary" Portable Washstand.* (Fig. 8,) by which sewer gases are avoided, and pitchers, bowls, and slop-jars are dispensed with.

By an ingenious contrivance, water is forced into the basin from a receptacle beneath the stand, with no more trouble than is required to turn it on from an ordinary faucet. It is adapted to both city and country houses, hotels, railway cars and offices. A variety of styles is manufactured, and old style washstands may have the improvement added at moderate cost.

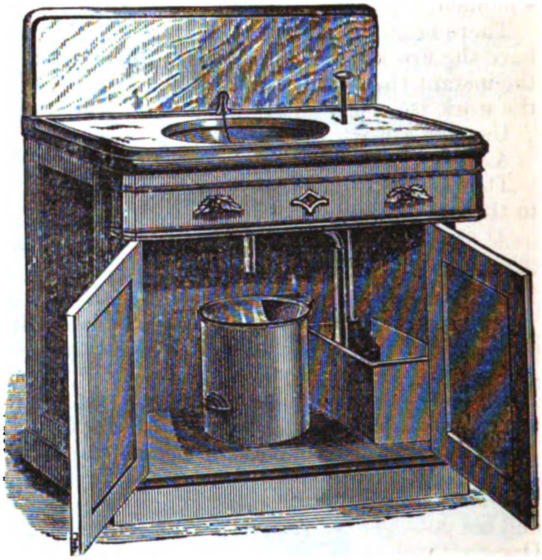


Fig. 9.—Sanitary Portable Washstand, (open.)

GROUP XXVIII.—HEATING, VENTILATING, AND COOKING.

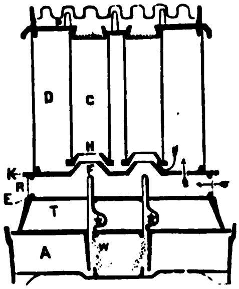


Fig. 10. Section of Stove.

A, Reservoir.
C, Chimneys.
D, Drum or Cylinder.
E, Diaphram. — leaving air space between burners and reservoir.
F, Air Deflectors or Cones.
H, Supplementary Cones, causing a Hot Blast from the hot air in the drum to the flame.
R, Perforated Ring— through which all the air passes to the burners.
W. Wick Chamber; from the oil reservoir the passage for oil being under the lower edge of partition, through a trap.

The recent low prices of petroleum and its products, have stimulated the invention of new modes of using it for heating, lighting, and cooking purposes, either in the liquid or gaseous form. Among the exhibits of the former mode, is the Whitney & Hall patent hot blast oil stove, improvement of 1879, exhibited by the Whitney Manufacturing Company, 1123 Chestnut street, Philadelphia, for which they claim that with this stove *perfect combustion is a certainty*, burning all smoke and gases, and preventing the disagreeable smell usually accompanying oil when combustion is imperfect.

The reservoir is cast iron, galvanized, holding two quarts, enough to burn twelve hours or more.

It is very portable, occupying a space only ten inches square.

It is very *convenient*, and free from objectionable features. No smoke, ashes, or dirt, or annoyance of kindling. It is ready at a moment's notice.

There is no delay or waiting to have the fire hot enough to use; the instant the stove is lighted, it is ready to cook or bake, and the instant the work is done, the fire is out and the heat ceases.

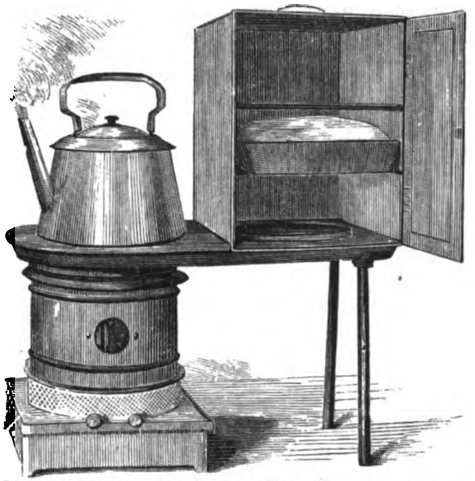


Fig. 10. Stove. Extension Top. Oven, medium.

Use kerosine or coal oil, the same as is generally used in lamps.

A large variety of oil stoves for heating and cooking were shown.

The extension top is a valuable addition to the stove, and adds greatly to the convenience in cooking.

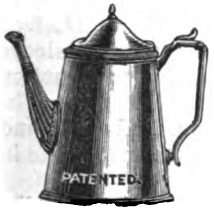


Fig. 14. Ideal Coffee and Tea Pot.

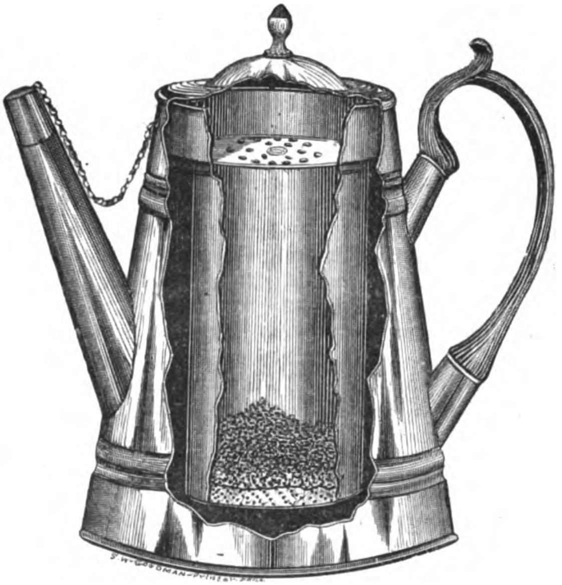


Fig. 15.

Two new styles of coffee and tea pots were shown. One by the *Ideal Coffee and Tea Pot Company*, 157 North Eighth street, Philadelphia, by the use of which they claim that the essence and aroma of the coffee are fully extracted from the coffee berry, and held in solution, so as to retain all its natural properties, flavor and strength. The same pots can be used for making tea with a corresponding improvement over the ordinary process. They exhibited coffee and tea pots (Fig. 14) on this principle in large variety of sizes and styles. The pot contains a filter, in which the finely ground coffee is placed, upon which boiling water is poured, and allowed to stand. There is no strainer in the spout to become clogged up.

H. NUTRIZIO, Philadelphia, exhibits his patent coffee pot, containing an inner compartment, in which the coffee and water are placed. Place the coffee in B, (Fig. 15,) and the boiling water in A, and use in a few minutes. To give the best results, the coffee should not be ground too fine nor too coarse.

Included in the patents of the Pennsylvania Heat and Light Company, 927 Chestnut street, Philadelphia, is a retort steam boiler, designed especially for placing on the platform of a street car, for power to propel the same, but equally valuable for road wagons, plowing, and other farm work, and, in short, wherever from one to ten horse power is required.

The same company showed one of William W. Goodwin & Co.'s ranges, fitted with their retort for cooking and heating purposes.

JAMES P. WOOD & Co., 41 South Fourth street, Philadelphia, exhibited ***R. F. Humiston's Patent Atmospheric Hydro-Carbon Light and Heat Generator*** fitted to their ranges to use liquid fuel for cooking, illuminating, and heating purposes.

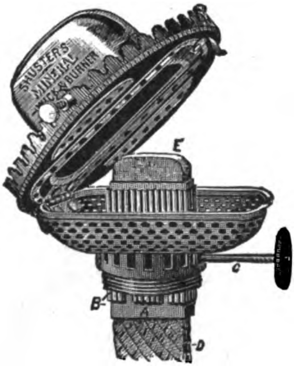


Fig. 16.

GROUP XXIX.—ARTIFICIAL ILLUMINATION.

JOHN T. SHUSTER, Twenty-second and Hamilton streets, Philadelphia, exhibited his ***Mineral Wick and Burner***, patented June, 1879, for which he claims that it is absolutely indestructible, free from odor and smoke, and needs no trimming. In Fig. 16, A shows the wick tube; B, corrugated sleeve; C, ratchet wheel; D, feed wick; E, mineral tip. The corrugated sleeve (B) allows the gases generated by combustion free exit, obviating liability of explosion. The cotton wick (D) simply acts as a feed wick, and does not need replacing, as it does not come in contact with the flame.

THE PENNSYLVANIA HEAT AND LIGHT COMPANY, 927 Chestnut street, Philadelphia, exhibit ***Holland's Hydro-Carbon Retort and Oxyhydro-Carbon Illuminator***, using crude petroleum or naptha, in connection with water, to produce a clean fire and intense and regular heat almost instantaneously. The same fire that is used for cooking, will furnish gas to light the house; the same retort can also be used for heating, without making illuminating gas, if desired. It is claimed that three gallons of oil will furnish one thousand cubic feet of gas, of ordinary strength, with this apparatus.

Another of these inventions is Holland's Oxyhydro-Carbon Gas Light, designed especially for lighting streets in towns and cities, railroad depots and yards, large machine shops, and factories. By this little retort, a pure gas flame, of about eighteen by twenty-four inches in size, is produced, perfectly soft and mellow, and yet of exceeding brilliancy.

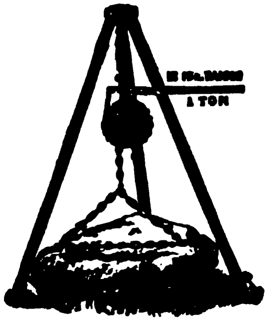
DEPARTMENT IV.—Tools, Implements, and Machinery.

By THOMAS G. JANVIER, C. E., Superintendent, with a supplementary note on self-binders, by President ALFRED L. KENNEDY, M. D., Polytechnic College, Philadelphia.

The display of machines, implements, tools, &c., was unusually fine and attractive. To the exhibitors it was most satisfactory, on account of the absence of horse racing. At fairs where racing is the prominent feature, the farmers look around a short time in the morning to see anything new among the exhibits, but when the hour for racing arrives, they leave for the track, and are seen no more. At this fair, however, the case was entirely different, and in consequence the sales made by the exhibitors were unusually large and gratifying. The amount of machinery, &c., in motion, as well as in actual operation, was considerable, embracing among the former, mowers, reapers, threshers, powers, &c., &c., and among the latter, binders, coffee hullers, cider presses, brick machine, blacksmith forge and blowers, grinding-mills both steam and horse-power, dairy, and cheese factory, incubator, creamery, paper-cutting machine, wood-turning machine, &c., &c. The bee hive was to many both a new and attractive sight; the bees going out through an aperture in the wall, returning laden with honey, and going to work as only the busy bee can. This was rendered more interesting as the slides were taken out for the purpose of hunting for the queen bee, readily distinguished from the workers by its large size. The brick machine is worthy of more than ordinary notice, doing its work in a most satisfactory manner both to the exhibitor and the spectators, turning out bricks with great rapidity, and compactly and perfectly made.

GROUP XXX.—CLEARING LAND.

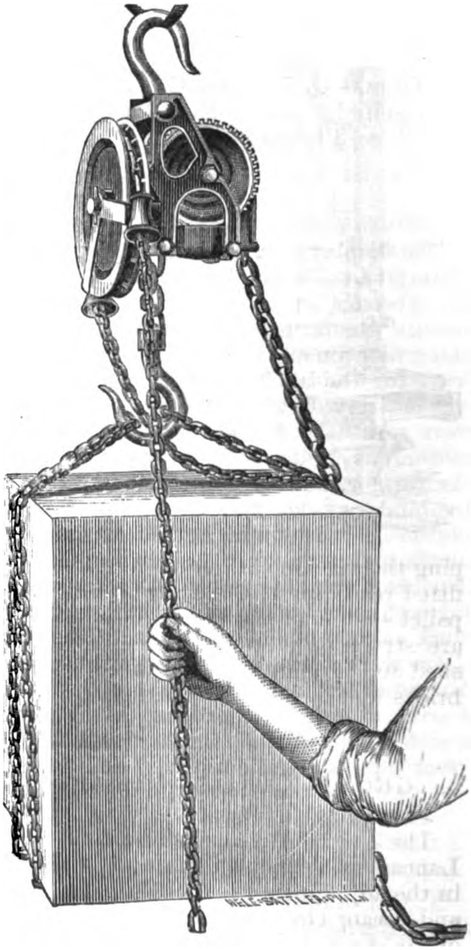
A. C. COTTON, Vineland, New Jersey, exhibited the *Davis Stump and Stone Extractor.* The yoke, which is suspended by a chain from a tripod or any suitable frame-work, has a heavy iron pin passing through its lower part, and carrying a ratchet and a sprocket wheel rigidly attached to each other, and revolving together. The sprocket wheel is provided with spurs for carrying the lifting chain. Above the ratchet wheel, and attached to the yoke, are two pawls, which engage with teeth of said wheel. Above the pawls, and passing through the yoke, is a rod, which serves as a fulcrum for the lever, to the end of which a link is attached, which engages, as the lever is raised, with a tooth of the ratchet wheel. By depressing the lever, a powerful tension is brought upon the chain attached to the



stump. This operation is continued until the stump is drawn. The lever is adjustable, so that the power or the rapidity can be increased as desired.

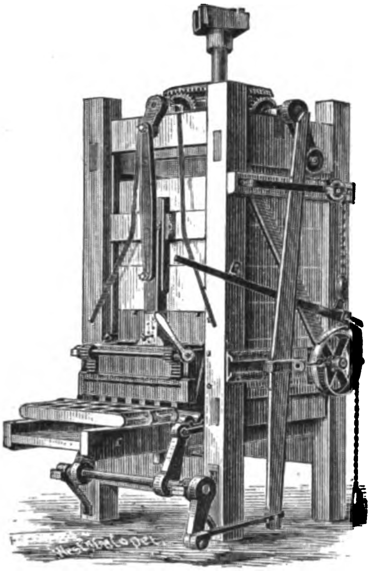
GROUP XXXI.—Removing and Breaking Stone.

Alfred Box, Philadelphia, exhibited a very ingenious and complete *Hoisting Machine.* It consists of two screws or worms, with gear wheels, between a hand chain wheel and said screws. By the use of the screws the strain is distributed equally on each side of the lifting chain, and the worm wheel, thus keeping the machine in perfect balance. The load being, thus distributed on two screws, each one does half the work, thereby reducing the pressure against the worm wheel. Worms and thrusts present twice the amount of wearing surface, reduce the friction, and increase the strength and durability of the apparatus. By means of the gear wheels between the hand chain wheel and screws, the power is greatly increased. The lifting chain passes through eyelet holes in the bottom of the machine, which always keep the chain in a line with the wheel, permitting it to be worked in any position. The screws run on hardened bearings, and in oil chambers. The weight is carried on the rim which drives the wheel. The load can be held at any desired point; but lowered rapidly when started. The machine is very short, and can be readily used for low lifts.

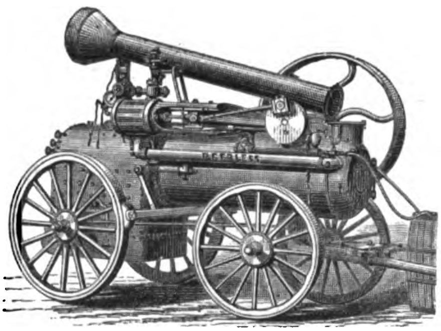


GROUP XXII.—Working Clay.

Beautiful displays of the skill of the potter were distributed throughout the building, and the coarser fabrics, such as crucibles and stills of refractory ware for chemists' use, vast pots for the glass-maker, and retorts for the glass-works were to be seen. But there were no potters at work, and the implements of the trade were scarcely represented. Paving tile of varied tints, in hexagons, squares, and diamonds; drain tile of all the established forms and diameters, and bricks of many colors, shapes, and sizes, for architectural ornamentation, were shown; but there seemed to be a lull in the usual sharp competition of rival machines, and the only power brick machine on exhibition was that of H. Martin, Lancaster Pennsylvania, and known as *Stock Brick Machine.* It is automatic in construction, and is what is termed a sand striking machine, the molds being dusted with fine sharp sand before using. It grinds and tempers the clay, being particularly adapted to working hard and heavy material. It does its own molding, delivering the bricks in front, ready for the carrier. The molds are delivered by the power of the machine, and while the pressure is on, thus preventing the drawing up of the bricks while being delivered, making good square corners, and well-defined edges. The lever, connected with the haul-out, is arranged with a movable center, held by a friction pulley, so that, should a stone or any hard substance get into the mold, the center of the lever simply moves forward, giving time to remove the obstruction without stopping the machine. By raising the lever connected with the friction pulley, the center moves back, and the machine operates as before. The steam-power machine is made complete with an extra gear, pinion, and clutch. The clutch, to unship and stop the machine, is so constructed that it will draw apart by the revolving of the shaft, stopping the machine in less than one revolution. The horse-power machine is fitted ready for the sweep, requiring one pair of horses to operate it. The pallet system of handling bricks was here shown to perfection. The bricks are struck from the molds upon boards or pallets, these are carried to a shed and arranged in tiers to dry, no extensive floors are required, and no bricks lost by storms or bad dumping.

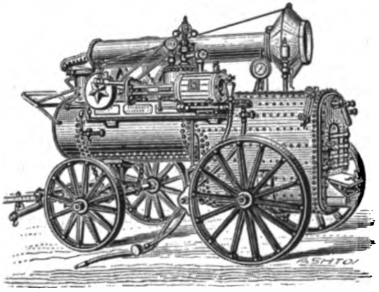


GROUP XXXIII.—Motors and Means of Transmitting Power.



The *Engine* of Francis Hershey, Lancaster, Pennsylvania, is shown in the adjoining cut. The cylinder and steam chest are combined in one casting, making only one joint on the steam chest. The cylinder is made with one end closed, except a small opening in the center, in which a brass stuffing box for the piston rod is inserted; it is bolted at one end to a flange, cast on the end of frame of bed plate. By this arrangement it is free to expand as it rests on a bracket fastened to the boiler, allowing said bracket to slide under the cylinder as the boiler expands and contracts, thus relieving the engine and boiler from all strain, caused by expansion and contraction. The bearings for the crank shaft can be adjusted from four sides, upper, lower, right, and left. The support between the boiler and these bearings is cast hollow. Through this the water passes on its way to the boiler, absorbing the heat which would otherwise cause the bearings and journals to become too hot. When the water is not required in the boiler, the flow is kept up by opening a valve and allowing it to return to the tank. The crank shaft extends through the fly-wheel far enough to admit of an extra pulley being put on, if desired. The crank is a cast iron plate wheel with counter weights opposite the crank pin, producing a smooth and steady motion. The eccentric is arranged, so that by loosening a nut on the front of the crank wheel, it can be reversed to produce the opposite motion of the engine. The governor is connected directly to a balanced valve, making it direct acting. It can be regulated while the engine is in motion, and is driven by a shaft running lengthwise with the boiler and propelled by two small bevel wheels connected with the crank shaft; at the other end is a pulley from which a belt runs to the pulley of the governor.

NICHOLS & SHEPARD, Battle Creek, Michigan, have in their *Threshing Engine* the cylinder entirely jacketed, and provided with improved oiler and lever cylinder cocks. The piston is fitted with metallic packing rings, held in and adjusted by steel springs. The valves and slides are constructed in locomotive style. The crank is a balanced disc, perfectly finished on the edges and both faces. The main shaft is provided with brass bearings, adjustable at the top, bottom, and both sides. In the pump, the air and valve chambers are entirely of brass; no bolts are used in its construction, the connections being made by a screw thread, so that access to the valves can be easily and quickly had.



The boiler is made of charcoal hammered iron, and is double-riveted, which gives great strength and durability. The flue sheets are made of half inch iron; the holes for the flues being drilled, instead of punched. The flues are made of lap-welded iron, and provided at the ends with copper ferrules; they are placed in perpendicular rows; the sediment descends through the column of water, and is taken out at the hand-holes. The fire box is surrounded with water on all sides. The crown sheet is made very heavy, and provided with a fusible safety plug.

The traction attachment, shown in this cut, is intended to assist in the transportation of the engine, horses being attached to guide, back up, &c. An inclined shaft at one side of the boiler, is provided at each end with a bevel wheel. On the main shaft is also a bevel wheel, which transmits the power to the inclined shaft, and thence by means of a large bevel wheel to a horizontal shaft, which extends across and under the cylinder of the boiler; this shaft is provided with spur pinions, which drive large spur wheels, connected by pawls and ratchets to the hubs of the hind wheels. The traction attachment can be quickly thrown in and out of gear, by means of

The
NICHOLS, SHEPARD & CO.
TRACTION ENGINE.
BATTLE CREEK.
MICH.

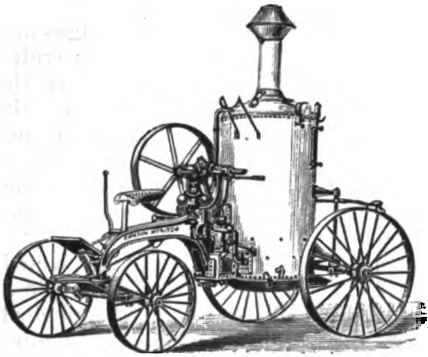
a fixed key and two set screws, holding the bevel wheel on the upper end of inclined shaft.

For some years past much attention has been given to the encasing of steam pipes and other heated surfaces, with various non-conducting materials, in order to prevent loss of heat by radiation and air convection.

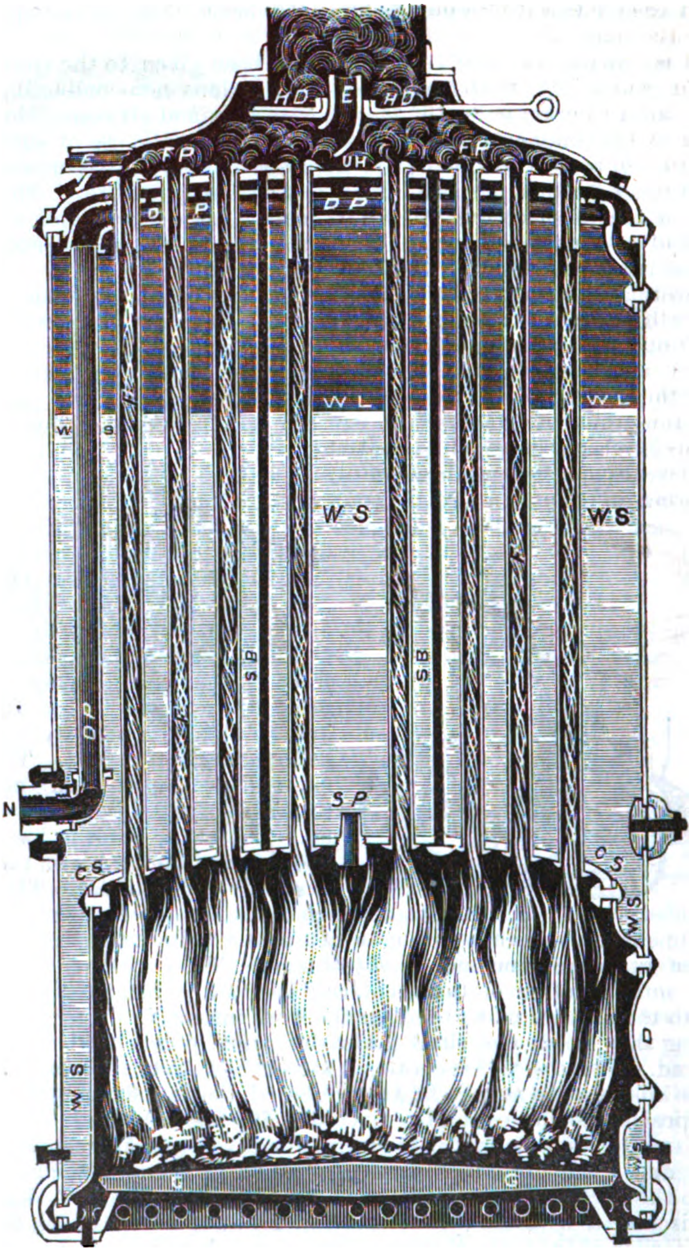
The general economical results that have attended the use of such materials, have led to a close study as to what constitutes the essentials of the best substance for this purpose, which has shown them to be: Slow conduction of heat, lightness, combined with strength, ease of application, removal, and re-application, adaptation to the different forms of heated surfaces, and incombustibility.

The article manufactured by the Burgess Steam Pipe-Covering Company, Philadelphia, is composed of vegetable fiber and sawdust, molded into a light but firm body, of sufficient compactness to prevent the permeation of heated air through it, while its porous texture is such as to insure that cellular structure most effective for non-conducting purposes. From the nature of this material it can be cut or sawed, and thus fitted to elbows or bends of steam pipes, and the irregular forms of boilers. By a peculiar treatment, it is rendered non-combustible.

The *Vertical Engine* of C. Aultman & Co., Canton, Ohio, is attached to their vertical boiler, and at a distance to allow the communication of but little heat to it, so as not to be affected by the expansion and contraction of the boiler. The pillow blocks, ways, cylinder, steam chest, and heater are substantially in one piece. The main driving shaft is made of steel and hollow throughout, combining great strength and little inclination to heat. The journals and wearing parts are made adjustable so any wear may be taken up. The steam chest is located on one side and the heater on the opposite side of the cylinder. The heater is provided with a lime extractor, which takes out the lime and most of the sediment, thus insuring clean water in the boiler, and removing the source of much vexation and possible danger. The governor is set to run a given number of revolutions, but can be readily changed to speed the engine to the number best suited for the work intended.



Having thus briefly described the engine, a few points of the boiler will be noticed. The sheets have a tensil strength of sixty thousand pounds; after the holes for the stay rods, &c., are bored, they are firmly put together the vertical seams being double riveted. The flues are made of charcoal iron, lap welded and secured at their lower ends to the oval crown sheet, and at their upper ends, provided with reducers or protectors, which draw the flame to the center of flues, preventing burning or leaking. A damper or evener is placed over the top of the center of the flues, causing the draft to be distributed through all alike. The crown sheet is oval shaped, which does not allow the accumulation of any sediment upon it. The agitation of the water carries the dirt to the water space about the fire box, from which it is easily removed by the blow off and hand holes near the bottom of the boiler. A soft metal plug is placed in the crown sheet, and in case the water gets too low, from carelessness, the plug melts and discharges the water into the fire box.



The firm of HEEBNER & SON, Lansdale, Pennsylvania, has improved its *Tread Power* by adding the level tread or lag and the speed regulator. The chain is carried around at the ends on a reel, and momentum is given to the main shaft by gear from the reel shaft through an intermediate gear. The level tread enables the horses' feet to be always in an easy position, preventing any unnatural strain. The object of the speed regulator is to check the speed of the power at a certain point, preventing accident to the horse in case the belt flies off; it also holds the speed at a uniform rate, whether the machines attached to the power are at work or not.

Fig. 1 is the rim inside of which the regulator works or revolves, and is screwed fast to the frame of the power.

Fig. 2 is the regulator which is attached to the band-wheel shaft, revolving with it.

Fig. 3 is the regulator in position. It consists of two iron balls, of suitable weight, attached to arms, the opposite ends forming cams that operate against the wooden shoes. When the speed of the shaft reaches a certain point the balls fly outward, causing the cams to operate against the shoes, and these pressing against the projecting rim produce friction, thus checking the speed. The balls are adjusted to act more or less readily by a spring and thumb screw.

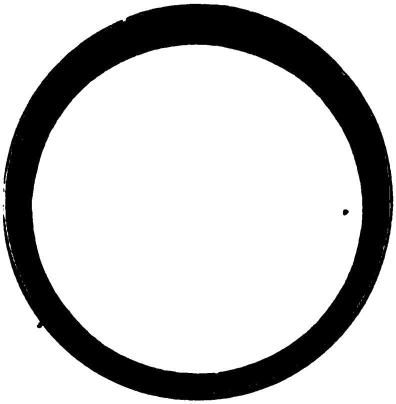


Fig. 1.

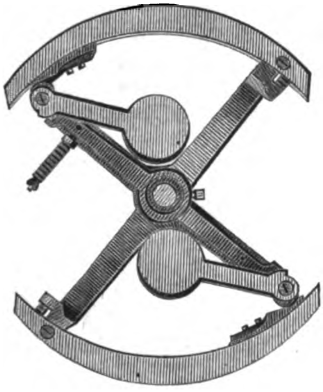


Fig. 2.

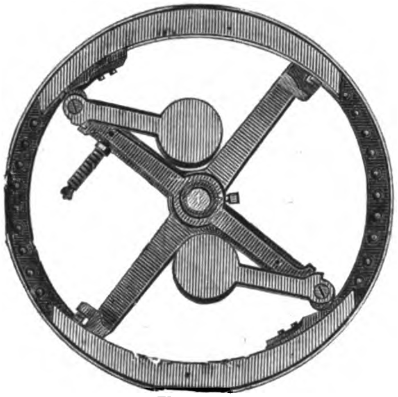
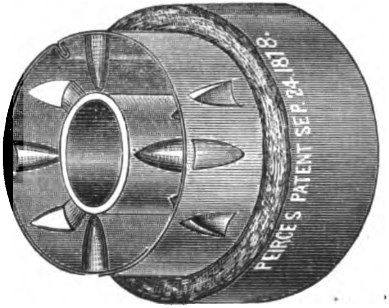


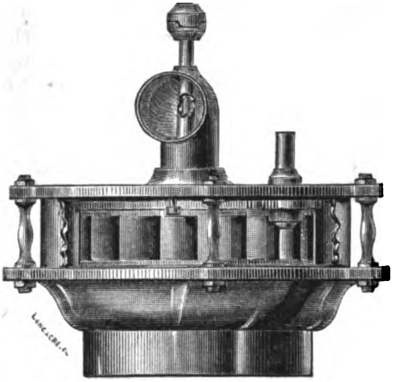
Fig. 3.

Tread Power.—In this power anti-friction rollers are used between the cylinder tracts or drums, one of which is in a state of rest, while the other revolves over its outer periphery. The outer one has on its side an internal gear wheel, connecting with the pinions of the fly wheel shaft, giving a double gear with but one shaft. The track wheels and links are provided with long hubs, to prevent wear. The power rods are made of the best cold rolled-iron, and braced in the center of the power by a center link, which prevents them from springing with the weight of the horses.

J. NEWTON PEIRCE, Philadelphia, exhibited *Peirce's Metal Jacket and Movable Pipe Covering.* It is made of thin sheet iron, cut in suitable sizes; then pinched over its surface with V shaped openings, the tops remaining attached, and bent at right angles, to the sheet, all on the same side, as shown in the cut. These sheets are then shaped to fit the boiler or pipe, with the points resting against the surface of same, thus forming a perfect air chamber between pipe and

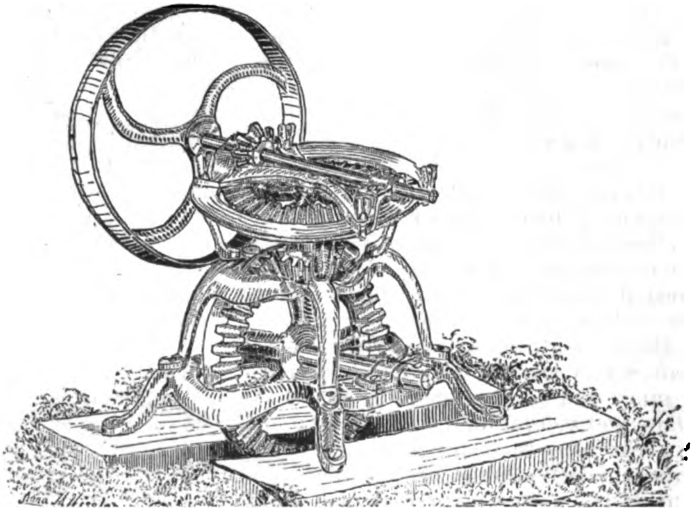


jacket. The pieces or sections have one or more edges turned over, in the form of flanges or break joints, by which they can be attached to each other, the flanges being brought together, and firmly clamped, with a piece of heavy U shaped wire. The pipe being incased with this metal jacket in sections, the latter are then covered, or filled in, between the flanges, with a good non-conducting material, securely confining the air in the air chamber. To remove a section, the clamps are pulled out, and the section lifted off.



The *Improved Turbine Water-Wheel* of J. C. CLINE, Philadelphia, has a wheel case with a removable cover, on the under side of which is a central annular chamber, and, in the sides of this, a series of shutes. From these the water escapes to the wheel. It has a pen-stock, centrally located above the wheel case, and connected to it, for registering with the annular chamber. Said pen-stock is made with a bearing for the wheel shaft, which passes through it. Surrounding the shute chamber is an annular gate, provided with a flange, by which it is suspended in brackets from the top of the wheel case. Said flange is furnished with a rack, which meshes into a gear-wheel, having its bearing in the top of said case, so that, by the action of the gear, the gate is adjusted, causing its openings to register with, or vary from, those of the shutes.

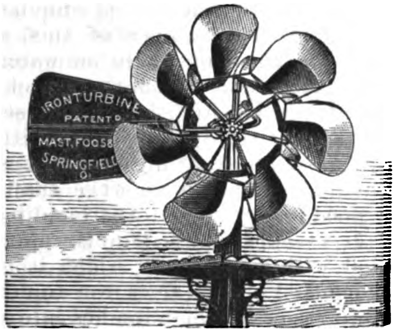
The Aaron Wissler Universal *Horse Power Jack* is shown in the accompany cut. The boxes of the horizontal top shaft, with band-wheel and pinion attached, are supported by a stationery ring around the crown-wheel, said wheel meshing into the pinion, thus communicating motion to the band-wheel. The boxes are movable on the ring to any position so the band-wheel can be set in any direction that may be desired.



The display of *Wind-mills* was very fine, several being in operation outside of the exhibition building.

That of S. W. KENNEDY & SON, Philadelphia, is so constructed that if a storm arises while it is in motion, its edge will be presented to the wind and it will stop, as soon as the storm passes it will resume work. It has but three joints to work the mill, is strong, compact, and simple. The anti-friction balls, upon which it revolves on its axis, and the bearings are chill hardened, require no oil and enable the mill to run in the slightest breeze.

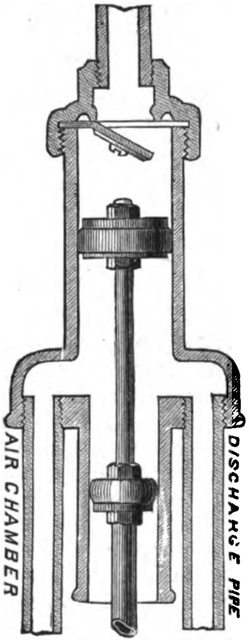
The *Iron Turbine Wind Engine*, made by Mast, Foos & Co., Springfield, Ohio, and exhibited by P. P. MAST & Co., is made entirely of iron, and on the side-shifting principle. The wheel and its shaft are placed nine inches from the center of the turn-table, and in such a manner that the extra pressure of the wind against the wheel, during a storm, shifts it parallel with the rudder or tail-vane, and out of the wind. The tail vane is so connected with the turn-table that its weight holds the wheel in the wind, and, when the latter is shifted out by a storm, brings it back to position as soon as the storm passes, making it self-regulating. The buckets of the wheel are made of sheet-iron, and so shaped that, when in motion, they produce a suction, which concentrates the wind against the face of the wheel, and discharges it from the center back of it, on the turbine principle. The motion is communicated from the crank-wheel on main shaft to the pump rod, by a pitman and triangular walking-beam, which nearly does away with the side vibration in the stroke of the pump-rod, and furnishes a convenient arrangement for changing the length of stroke and increasing the power. The journal-box of main shaft is eleven inches long, and lined with babbit metal, with a recess in the center for holding oil. The pitman is connected with the wrist-joint of crank-wheel by an adjustable brass box, with globe or oiler. The pump-rod is connected with the walking-beam by two tapered steel-set screws for taking up any lost motion caused by wear. The wheel can be thrown in and out of gear at pleasure. The entire engine is well and substantially made, and very durable.



GEORGE W. CANBY, Philadelphia, exhibited the *Halliday Wind-mill.* The bed-plate is a strong casting resting on, and bolted to, two masts secured in the tower, or on substantial frame-work, built from the ground. On this plate revolves the turn-table, held in position by bolts reaching under said plate, and provided with rollers, allowing it to turn freely as the wind changes its direction. The rollers run on a lathe-turned track, and are protected from the weather by flanges on the turn-table. The spider, to which are bolted the arms of the wind-wheel, is firmly keyed to the main shaft, which rotates in babbit-lined boxes. On the inner end of this shaft is keyed the crank-plate, and to this the pitman is attached. The main feature in this mill is the regulating gear, consisting of sliding head, elbows and their connections. The inner end of each elbow is connected with the sliding head by means of a link, and the connections from the outer ends of the sails by regulating rods; on the outer ends of these rods are regulating or governing weights, acting like an engine governor, causing the sails to present less surface to the wind as its velocity increases. By means of a

lever and weights, acting in opposition to the governing weights, the sails are made to present more surface to the wind as its power decreases. The sails can be furled and mill stopped by means of a cut-off rod.

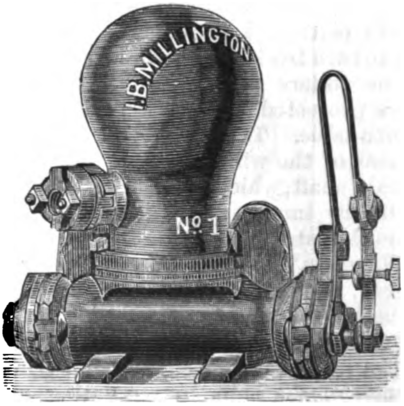
GROUP XXXIV.—RAISING WATER AND COMPRESSING AIR.



P. P. Mast & Co., exhibit the *Buckeye Pump*. The cylinder is porcelain lined, the upper part is one half the capacity of the lower. It has two plungers connected by an iron rod. The upper one is solid, and the pressed leather packing prevents any escape of water at the top of cylinder; the lower one has a valve opening on the down stroke and closing on the up. As the plungers start on the up stroke, the upper one makes room for one half of the water in the cylinder, the other half being forced out through the discharge pipe; on the return stroke the upper plunger forces the water in that part of the cylinder down, but as the water is at the same time rushing up through the valve in the lower plunger, the surplus is forced up through the discharge pipe, thus keeping up a continuous stream with both motions of handle, thereby greatly reducing the friction. One of the pipes supporting the cylinder acts as an air chamber, which keeps the flow of water steady.

The first *hydraulic rams* used in this country were imported in 1826, and put up in North Carolina. They had no arrangement for keeping the air chambers supplied with air, and after working a month, it would become exhausted. The rams would have to be taken apart, the water taken out of the air chamber, then put together and started. Since then great improvements have been made, some of which will be briefly noticed.

I. B. Millington's, of Columbia, Pennsylvania, is so constructed that a small quantity of air is forced into the chamber at each stroke, keeping it properly supplied and enabling it to run without stopping. It is made with a crooked cylinder, the valve under the air chamber standing at an angle of forty-five degrees. The cylinder is larger than the inlet pipe and outlet valve, the latter being closed before the cylinder is entirely filled with water; the remaining space is filled with air which cannot escape. This air is compressed to the same density as that in the air chamber, at every stroke and before the valve leading into said chamber is opened. When the force of the stroke is expended and said valve closed, the compressed air in the cylinder re-acts instantaneously with the re-action of the water, making action and re-action about three times as great as that produced by water alone, and greatly increasing the power of the ram.



In the ram of **H. H. Heise**, Columbia, Pennsylvania, the cylindrical base is cast with a face plate for receiving the air chamber, which has an open bottom. A central opening in said plate leads from the cylinder into said chamber. There are two discharge conduits, opening on each side of the central orrifice, extending at right angles to the axis of the cylinder and across its periphery, and are intended for elevating water from either side of the ram, when one is being used the other is closed. Between the air chamber and face plate is a clamped leather gasket, to which is hinged a flap valve covering the opening between said chamber and cylinder. To the cylinder head is attached one end of an inverted U shaped spring, the other end being bolted to a bar, and to this a rod is fastened connecting with the waste valve. The play of the waste valve is regulated by means of an adjusting screw, extending through the above mentioned bar, and its point resting against the cylinder head when the valve is open. The water enters through an inlet pipe communicating with the open end of the cylinder,

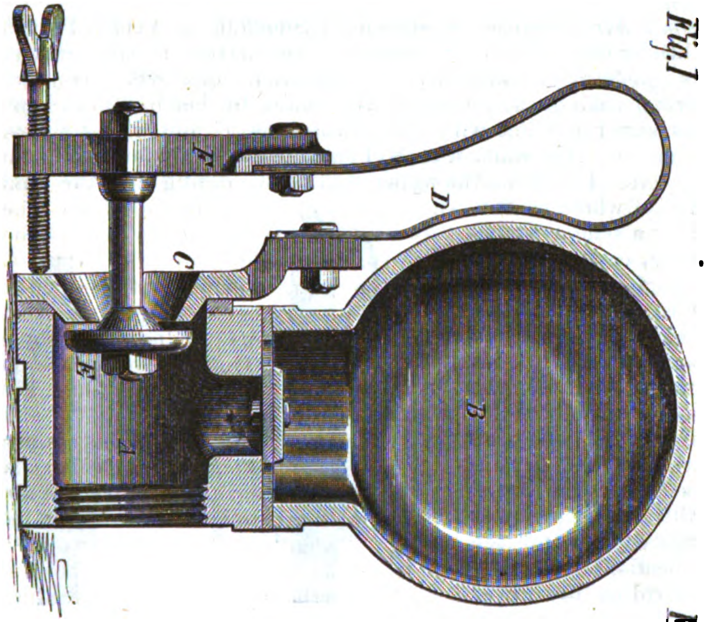


Fig. 1

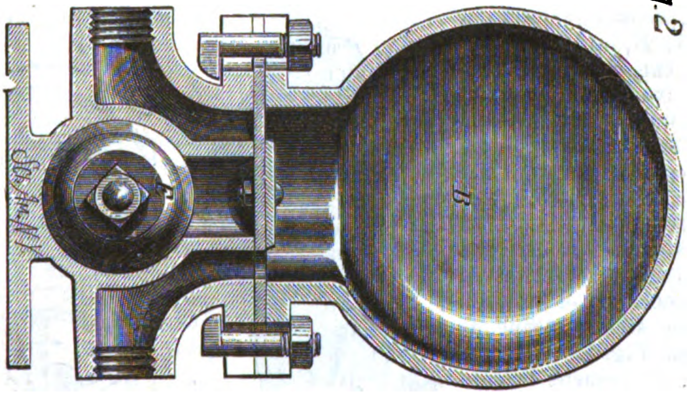


Fig. 2

the waste valve being held open by the carrying spring. When the escape of water around the valve and through the valve seat acquires a certain momentum it closes the waste valve, then forces its way into the air chamber through the central valve and compressing the cushion of air. When the momentum has thus been partially checked, the tension of the spring opens the waste valve for a repetition of the operation, while at the same time the pressure in the air chamber closes the central valve and the air cushion forces the water through one of the discharge conduits to the point of utilization.

Johnson's Air Compressor, shown by SHOENER & ALLEN, Philadelphia, will be briefly described by reference to the letters in the accompanying cuts. It consists of a fixed shaft or bearing, *C*, upon which is journaled a a cylindrical casing, *A*, closed at both ends by heads, *B*, and provided within its upper portion with valve chambers, *E* and *F*, containing inlet valves, *e'* and *f'*. The walls of each of said chambers are formed upon radical lines, and extend between the upper wall of the casing and the shaft; the upper side of which shaft is inclosed by a semi-cylindrical bearing, cast with and forming part of the walls of the valve chambers. In each of said walls is an opening, *e* or *f*, which affords communication between the interior of the chambers and the interior of the casing, *A*. A partition or lug, *D*, extends between the lower side of the shaft, the lower side of the casing, and the cylinder heads, for the purpose of dividing the lower part of said casing into two compartments. An opening, *e''*, between the inlet chamber, *E*, and the exterior of the casing, *A*, admits air into said chamber, while from the outlet chamber, *F*, an opening, *f''*, extends outward through the contiguous head, *B*. The casing being half filled with water, is caused to oscillate upon its shaft by means of the connecting rod between it and the steam engine, as shown in Fig. 1. The oscillating movement is continued in each direction until the front wall of the valve chamber is nearly horizontal, and impinges upon the water line, and with the following result: the front inlet valve, *e'*, in the direction of the movement

Fig. 4.

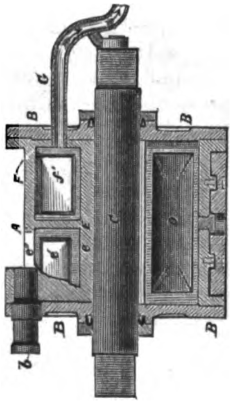


Fig. 5.

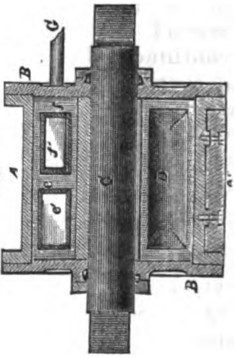


Fig. 1.

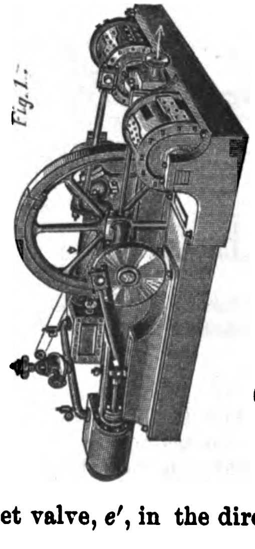


Fig. 3

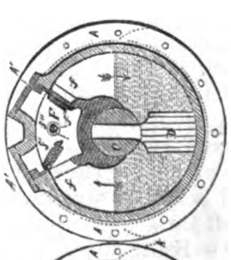
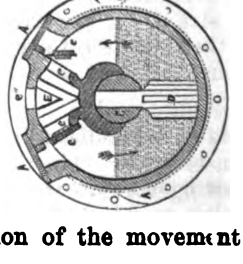


Fig. 2



will be closed, and the outer valve, f', of the same side, will be opened as the valve chambers approach the water line, thus forcing the air into the outlet chamber F, and thence through the opening f'', into a discharge pipe G. In consequence of the comparative immobility and incompressibility of the water, it presents a substantially solid bearing, against which the air is compressed by the downward movement of the valve chambers, which act like solid pistons. The partition D, holds the water stationery, and prevents its oscillating. The specific heat in the air is almost instantaneously absorbed during compression by the large quantity of water in the machine, which is kept cool by a continuous stream entering with the atmospheric air, all surplus being passed out with the air discharge, and separated from it in a receiver. The result of this is, the air during compression keeps at nearly the same temperature as the surrounding atmosphere, or cooler, if the supply of inlet water is of a lower temperature than the atmosphere. To counteract the tendency of the oscillating casing to shake the whole compressor, when moving with great velocity, weights, A'', are attached to the lower side of said casing; these counterbalance the weight of the valve chambers and valves, giving a very smooth and steady motion. The discharge of the compressed air from the first or receiving chamber, into a second, but smaller one, equalizes the motive power employed, and gives a continuous flow of compressed air of uniform pressure, consequently both the corresponding inlet and discharge valves are open during the whole stroke or oscillation of the machine. This compressor will operate equally well as a pump, or for exhausting gas or air from mines. When used as a pump, the cylinder should be submerged and inverted, or, if above the water, a suction pipe attached to the air supply opening, e."

GROUP XXXV.—MAKING, REPAIRING, AND SHARPENING TOOLS.

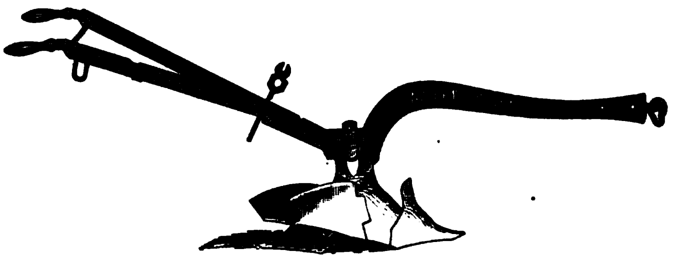
The display of **DAY BROS.**, of Philadelphia, was remarkably perfect in every respect, comprising nearly every tool and piece of machinery necessary or useful in a blacksmith shop. The *Hand Fan Blower* is, with the exception of the belting, made entirely of metal; the fan proper is enclosed in a case fifteen inches in diameter, open at the center of each side for replacing the air as fast as required. A belt from the lower driving wheel to the fan-shaft gives motion to the fan, the power being multiplied by an upper driving wheel connected by a belt to a small pulley on lower wheel. The upper wheel is turned by a crank, one revolution of which gives thirty-three revolutions of the fan; there are six paddles in the fan, thus giving about two hundred to one revolution of the crank. If necessary the crank can be turned fifty times a minute, giving one thousand six hundred and fifty revolutions of the fan, and nearly ten thousand paddles to draw in and press forward the air. A tin pipe is attached to the fan case, and carries the air to the tuyere iron in the center of the fire. The blast is powerful, and perfectly steady, being a great advantage over an ordinary bellows. A shaft three and a half inches in diameter can be heated to the welding point in twelve to fifteen minutes. The *Portable Forge* is made of iron, and about the size of an ordinary shop forge; the blast is given by a blower similar to the one described, except built into the forge instead of on a portable frame.

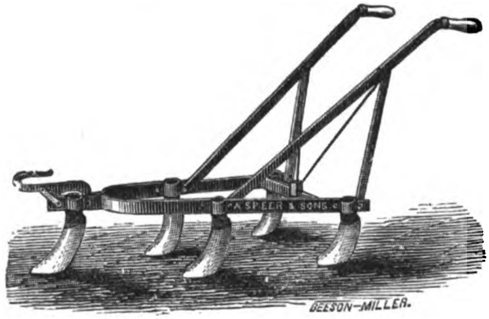
GROUP XXXVI.—TILLAGE.

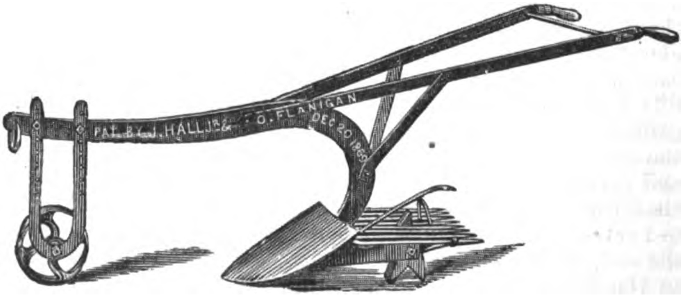
A. B. FARQUHAR, York, Pennsylvania, made an unusually large and very fine collective exhibit of implements and machines. His improved *Gang Plow* is an implement very easily managed, and readily adjusted; the frame work is made entirely of wrought iron; the plows are made either of steel or cast iron, as may be desired.

In his *Riding Cultivator* the frame is made of wrought iron; the shovels are made of steel, and reversible; each wheel is pivoted on a separate spindle, and adjustable by the feet of the driver, thus keeping the drag bars always parallel, and equally distant from the rows. It is very easily adjusted or regulated in depth, at the same time the spring plates will allow the shovels to pass over an obstruction without straining the cultivator. It is provided with a capital shield or sod fender, which protects the plant when small.

ALEXANDER SPEER & SONS, Pittsburgh, made a fine and interesting display of *Plows*, *Cultivators*, *&c.* In the hill side plow the beam and handles are made of wrought iron, mold-boards of steel, the balance cast iron. By pushing forward the rod at the side of handle, the clamp in front of the standard is thrown off; turning the team turns the beam and handles; by drawing back the rod the clamp is fastened on the opposite side of standard, and as the team starts up the mold-boards are thrown back by the pressure of the earth. In the *Iron Cultivator* the handles are made of angle iron, the teeth of plate cast steel, which makes the strongest kind. The teeth are round at the top, and held in place by two bars, one on each side, and secured by bolts. By means of slide bars at rear of cultivator it can be set to any required width by simply slacking the clamping bolt. The *Potato Digger* has beam and handles of wrought iron, and shovel of steel. The shovel runs under the potatoes, raises them with the dirt on to the riddle, this by its up and down motion caused by the roller at end of beam, casts them on top of the earth. It is very light running, and works admirably.






PAT. BY J. HALL JR & O. FLANIGAN DEC 20 1869

SYRACUSE CHILLED PLOW COMPANY, Syracuse, New York, made an unusually large and fine display of about one hundred *plows*, consisting of one, two, and three horse, also hill side or swivel plows. It would be impossible to describe all of these, and it is only necessary to add that they are made of the best material, in a substantial and workman-like manner, and give general satisfaction.

The **Wiard Plow Company's**, Batavia, New York, display was also a very creditable one, and though small in numbers, was worthy of all praise. It consisted of fifteen different styles of rare excellence.

The **South Bend Chilled Plow Company**, Indiana, made a most excellent display, their *plows* being highly finished and painted, they speak for themselves where ever used.

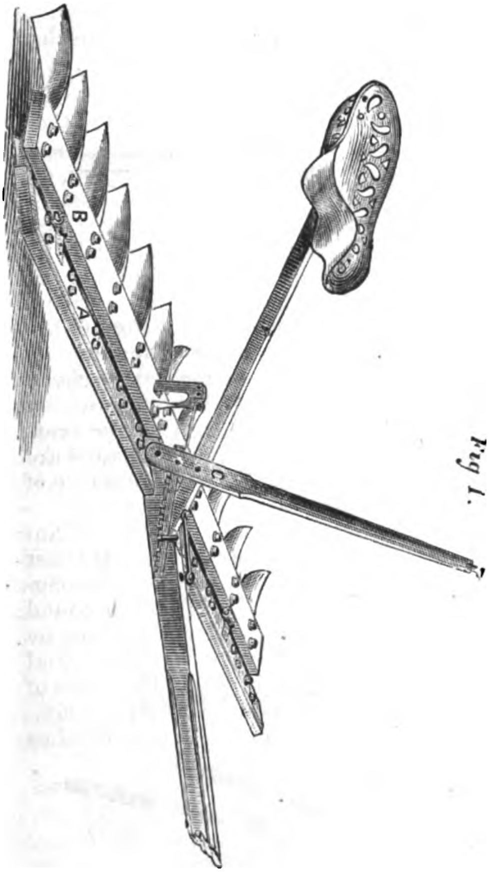
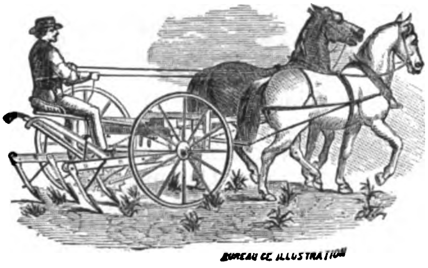


Fig. 1.

Nash & Brother, Harrisburg.—Their *Pulverizer, Crusher, and Leveler* is well worth noticing. It consists of a diagonal clod crusher and leveling bar or beam, (*A*,) permanently secured to the tongue, and provided with a series of spurs arranged under its rear edge. This precedes the harrow, crushes, breaks down the lumps, and levels the surface. To the crusher (*A*) is hinged the beam (*B*) provided with a series of sharp, curved, steel coulters which cut, lift, and turn the soil. By letting the lever (*C*) forward, the harrow is made to run mainly on the face of the crusher, and in this position may be easily moved from place to place.

Arad Barrows, jr., Philadelphia, made a creditable display of plows, rollers, iron, hog troughs, and agriculture steamers. The No. 5 *plow* is for meadow use, and has but few pieces in its construction, with a chilled cast-iron point. The Eagle self-sharpener has an extending steel point with share of chilled cast iron. The iron *field roller* was the only one on exhibition, the case is made of wrought iron, and is in two sections. The garden roller is also of wrought iron, made in one section, and filled with cement to give weight, the handle is arranged to use both ways, so the roller need not be turned.

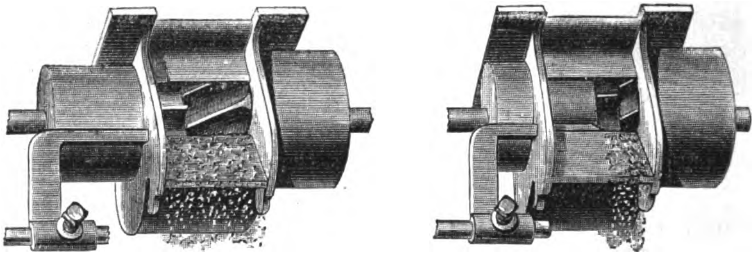


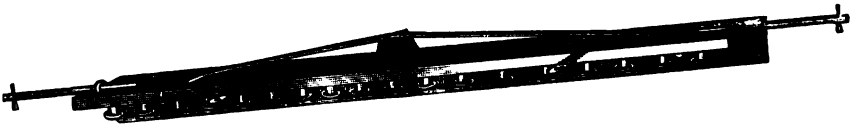
The *Two Horse Cultivator* exhibited by P. P. **Mast** & Co., Springfield, Ohio, is arranged for using either four or six shovels for plowing corn, and five or seven for fallow land. It can be used either for riding or walking, the seat being easily removed. The shovel beams are hinged in front, and supported in the center by a chain. They are independent of each other, and can be raised, lowered, or shifted from side to side, to accommodate themselves to the irregularities of the ground or the corn rows. The shovels can be turned to throw the earth to or from the corn, and are raised in turning by means of a foot lever. The guards for keeping clods from the corn, revolve, cleaning themselves of weeds or trash. The cultivator has high wheels, making it light draft.

GROUP XXXVII.—PLANTING.

ASAY & WOOD, Philadelphia, exhibited a *Combined Corn Planter, Fertilizer, and Cultivator*, which is so arranged that it automatically opens two furrows; drops the corn, and deposits the phosphate; covers them with soil, and rolls the same. The main frame is made of gas tube, placed on a steel axle, and mounted on two wheels. There are two hoppers, one at each side of the machine, each one having two compartments—one for corn, the other for fertilizer. The furrow opening plows have both a right and left mold-board, causing the furrows to be left in the form of a V, the depth being regulated by means of adjusted rollers in front of plows. By means of two disk wheels in the rear of each planting tube, the corn and fertilizer are thoroughly covered, then leveled and rolled by rollers following said wheels. The planter can be changed to a cultivator by removing the leveling rollers and disks, with their standards, replacing them with standards to which cultivator teeth are attached, and attaching similar teeth to each side of the opening plows, without changing their position. By this arrangement, sufficient space is left between the right and left gangs to permit the cultivator to straddle a corn row. By the use of a lever, the gangs can be deflected right or left to avoid obstructions, &c.

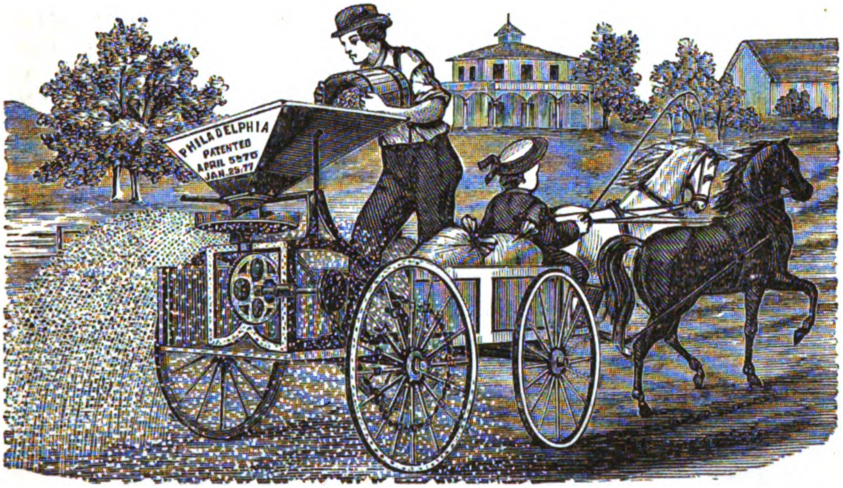
The *Drills* exhibited by Messrs. **BICKFORD & HUFFMAN**, Macedon, New York; **P. P. MAST & CO.**, Springfield, Ohio; **THE FARMERS' FRIEND MANUFACTURING COMPANY**, Dayton, Ohio; **J. E. MCSHERRY**, Dayton, Ohio; **THE HAGERSTOWN (Md.) MANUFACTURING COMPANY**, and **THE HARRISBURG CAR MANUFACTURING COMPANY**, well sustained the reputation of their makers.





These machines were so fully described in our report on drills in the last volume of the Society's Transactions, pages 362–368, that it is deemed unnecessary to repeat the description here. An illustration of the Harrisburg Car Manufacturing Company's Drill, which did not reach us in time to accompany our last year's report, is here inserted. It shows the forced feed arrangement to consist of receiver cup and feed roller, the latter being the longer of the two and grooved. The grooves, nine in number, run parallel with the axis of the roller nearly half its length, and there terminate in as many spiral grooves which turn towards the side of the cup. The rollers are attached to a shaft which has a traverse motion through the cups by which the quantity of seed fed may be increased or diminished, the change being made whether the drill be in motion or at rest. The combined action of the longitudinal and spiral grooves is a peculiarity of this machine, and its affect is to insure a continuous and uniform flow and delivery of seed without injury by rubbing. The lower cut shows how, by a truss-rod, the parts are kept straight.

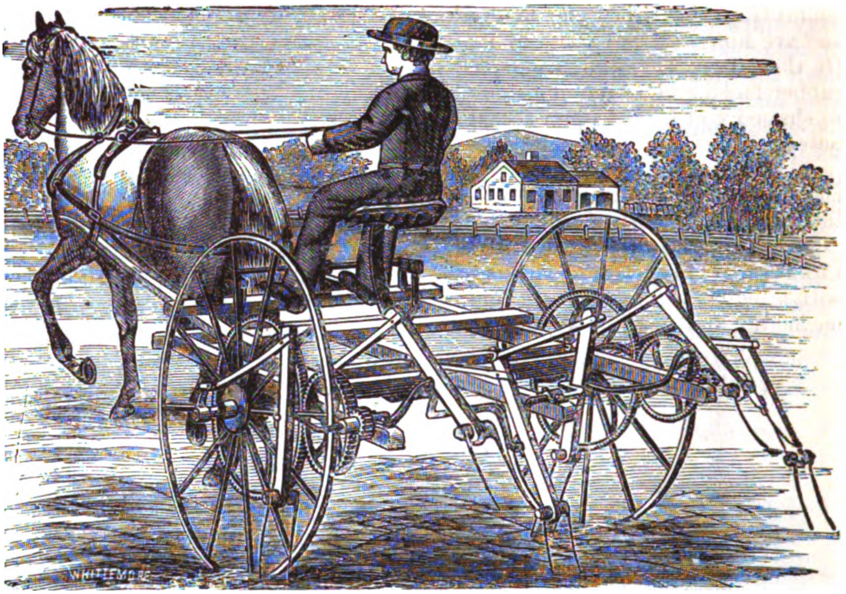
Among the many labor-saving machines, special attention might be directed to the *Philadelphia Broad-cast Seed Sower*, (hand and horse-power,) manufactured by BENSON, MAULE & Co. It is in popular use in the United States, Europe, Australia, South Africa, &c., and is one of the most important of our labor-saving machines. It will sow all the small seeds, also bone dust, plaster, phosphates, &c. The horse machine will sow from twelve to fifteen acres per day, with great uniformity; the hand machine from four to six acres.



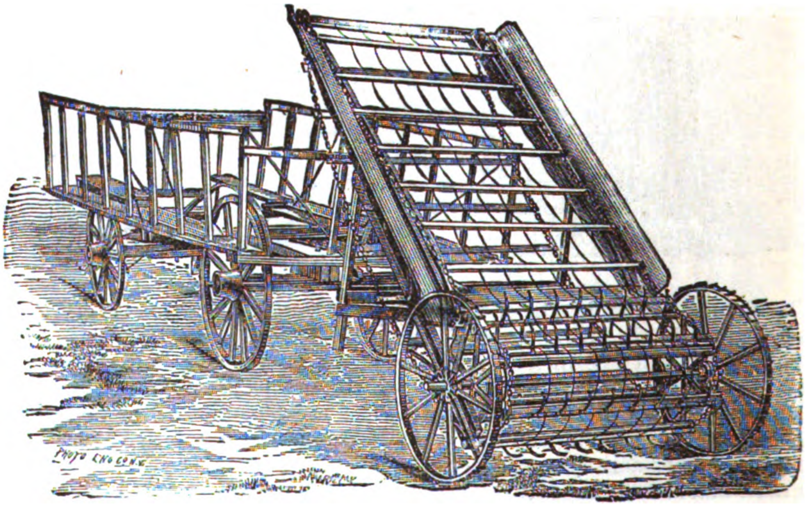
The larger sower can be attached to any wagon or cart. It is placed close to the off-side, the spoke-clamps are fixed on the wheel, so as to form a circle three feet six inches in diameter, for horses walking an ordinary gait. The chain is then placed over the clutch-wheel, and passed around the clamps. The grain can be sown to the right or left, or on both sides of the wagon, by turning the handle of feed guide in the desired direction. The quantity per acre is marked on a gauge-plate, which is easily regulated. The man machine is fastened by straps round the neck and waist.

GROUP XXXVIII.—GATHERING CROPS.

Bullard's Hay Tedder was exhibited by NASH & BROTHER. It has six levers, each carrying two tines, four of which are situated between the wheels and one on the outside of each. The tines are well secured on the projecting bar and bent up so that in revolving forward they pick up the hay and when forced back by the reel throw it off. By means of a small lever the gear-wheel can be separated from the ground-wheel.



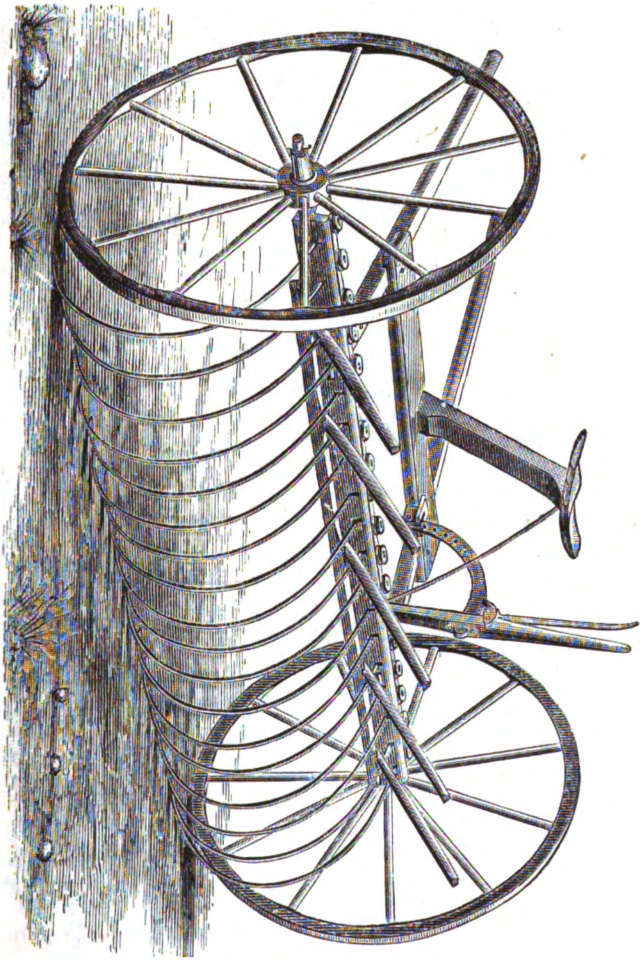
Foust's Hay Loader was exhibited by the same firm. The drum consists of drive wheels, shaft, boxes, and drum-heads, in which are the rollers



with teeth and arms attached. The hay is elevated by means of a carrier consisting of slats and chains. It also has two side boards and a windbreak attachment for windy weather. It is readily attached to any wagon, and is drawn by the same horses that pull the load.

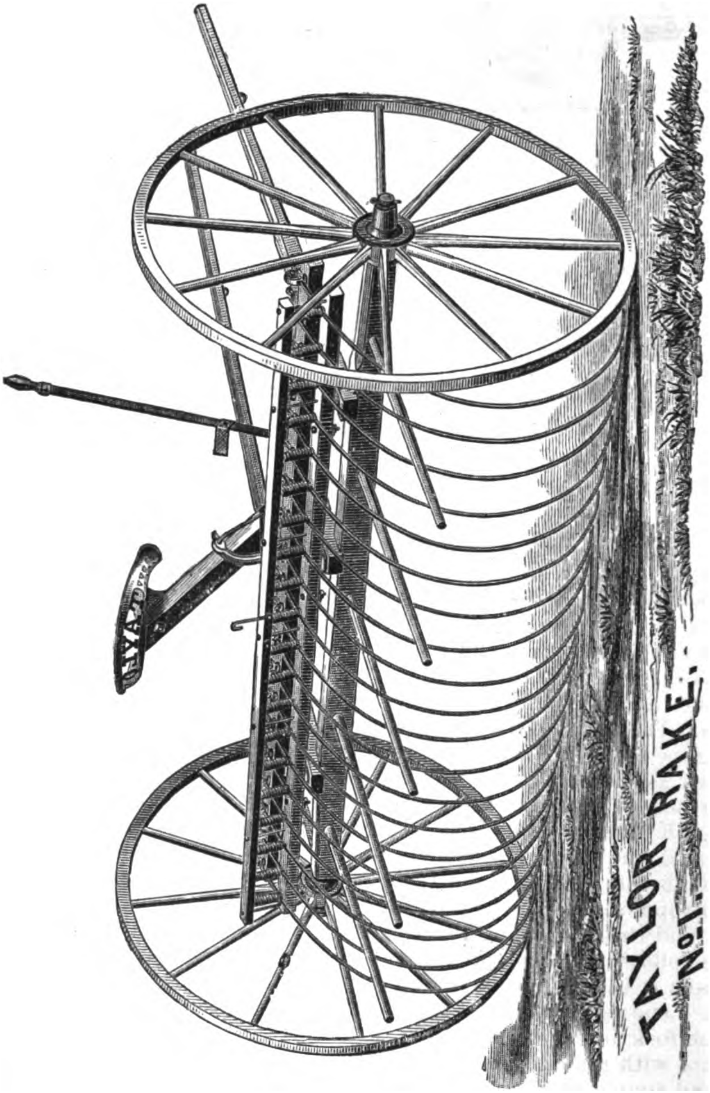
JAMES M. BURDICK, Brownsburg, Pennsylvania, shows a tedder with reel of sufficient width to cover two swaths of an ordinary mower, and forty-one inches in diameter. The reel heads are twenty-one inches in diameter, and are fastened to a center shaft with a spider to support the center of the fork rods, four in number, each having turned on one end a solid crank, and furnished with four two tined forks. These rods are joined by connecting bars, open in the middle so as to pass each side of the shaft, and are hung on the wrists of two opposite cranks at each end of the reel. On these bars, near the cranks, are two adjustable studs, on which are two rubber faced rollers moving upon the surface of an irregular eccentric cam, so shaped and placed upon the frame that the rollers hold each other to the outer edge of it, causing the cross bars to move back and forth as the reel revolves, thus giving an oscilating motion to the fork rods. The forks change their position twice in each revolution of the reel, 1st to gather up the grass and then to throw it off, leaving it well shaken and light.

The *Harrisburg Rake*, exhibited by the HARRISBURG CAR MANUFACTURING COMPANY, Pennsylvania, is new and much improved. The axle is made with a lengthwise truss rod running under it, with adjustable nuts, by this means it can always be kept straight and the wheels in a perpendicular line.



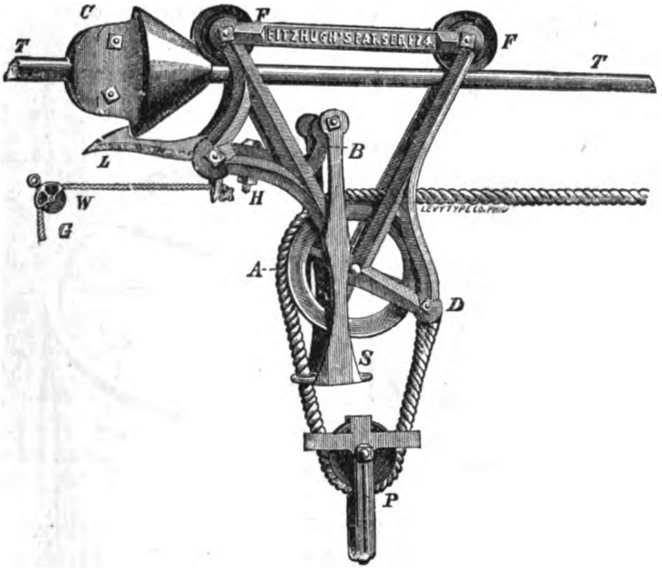
The teeth are separate and independent, fastened to the axle with a single bolt, by which a tooth broken can readily be replaced without disturbing the others; they are also adjustable, and by removing the adjusting pin to a higher hole can be set for raking stubble or to prevent scratching the ground and injuring the young clover. The arrangement for holding the teeth to their work by a spring latch, in connection with hinging them to the axle is such, that by a light touch the latch is released from its hold, and the rake dumps by the weight of the driver. The cleaning bar is hinged to and immediately behind the axle, and by its compactness allows the rake to gather to its full capacity; as the teeth rise to discharge their load the cleaning rods pass down pushing the hay off easily and thoroughly.

In the *Rake* made by B. C. TAYLOR, Dayton, Ohio, the teeth are made of cast steel tempered in oil, oval in shape making them very strong in proportion to their weight. Each tooth is entirely independent, held from vibrating by a patent bracket, and can be taken out and replaced quickly.


TAYLOR RAKE.
No. 1.
TAYLOR

A spiral spring above each tooth, supported by a patent guide standard with stop to protect it, gives it a compound spring, allowing it to raise and lower to accommodate itself to uneven ground, passing over roots, stones, and stumps with the greatest facility.

Fitzhugh's American Hay Elevator manufactured by Conrad & Murray, Philadelphia, is intended to be used with any horse hay fork, for unloading hay or straw from the wagon and carrying it any required distance into the mow, loft, or on the stack. It lifts the hay to the required height, holds it securely, carries it to the desired place, drops it and returns the fork to the wagon without any effort by the person handling it. It travels upon an iron rod stretched along and near the peak of the roof, extending from a point over the wagon, nearly to the end of the mow. The rod is supported at each end by a short piece of scantling spiked to a pair of rafters. The elevator is held to its work while hoisting by the latch, (6,) engaging with the catch (8) which is firmly clamped on the rod immediately over the wagon. The fork is attached to a rope shown cut off at bottom of cut. The small rope (12 and 13) is the return or weight rope for bringing the elevator back as soon as the hay is dropped. When the loaded fork reaches the proper height, it strikes the stirrup, (3,) lifts it, and trips the latch, (6,) allowing the elevator and fork to move into the mow. When the latch (6) is tripped, the brake (5) drops upon the hoisting rope, binding it firmly against the sheaves, (2,) and securely holding it from running down. The return rope brings the elevator back and latches it, the hoisting rope is released and the fork drops into the hands of the loader.



The following cuts represent the *Hay Elevating* apparatus of E. V. R. Gardner & Co., Johnsons, Orange county, New York:

Fig. 3 shows the car or carrier attached to the catch on the traveling rod and the fork ascending.

Fig. 4 with the latch unlocked and the fork tripped. The car is made of iron and simple in construction. When the fork ascends, the knob pulley strikes the latch, unlocking it from the catch, at the same time the knob becomes locked in the carrier and holds the weight of the hay, taking the strain from the draft rope.

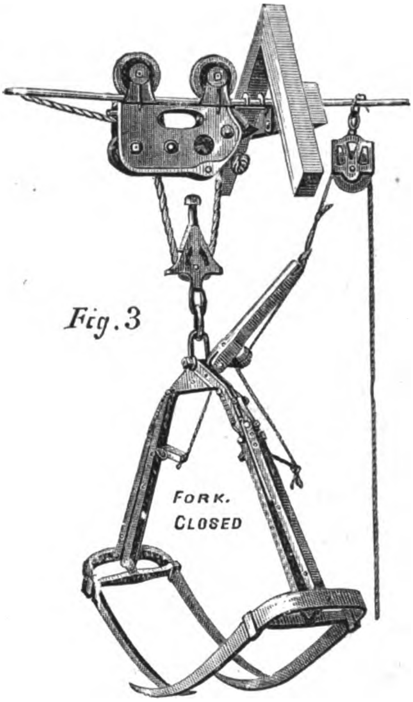


Fig. 3

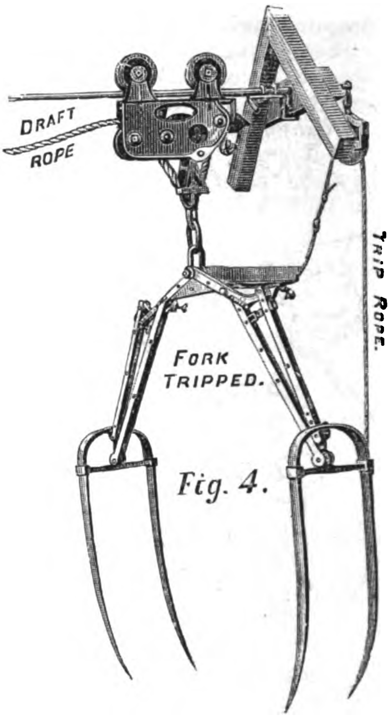


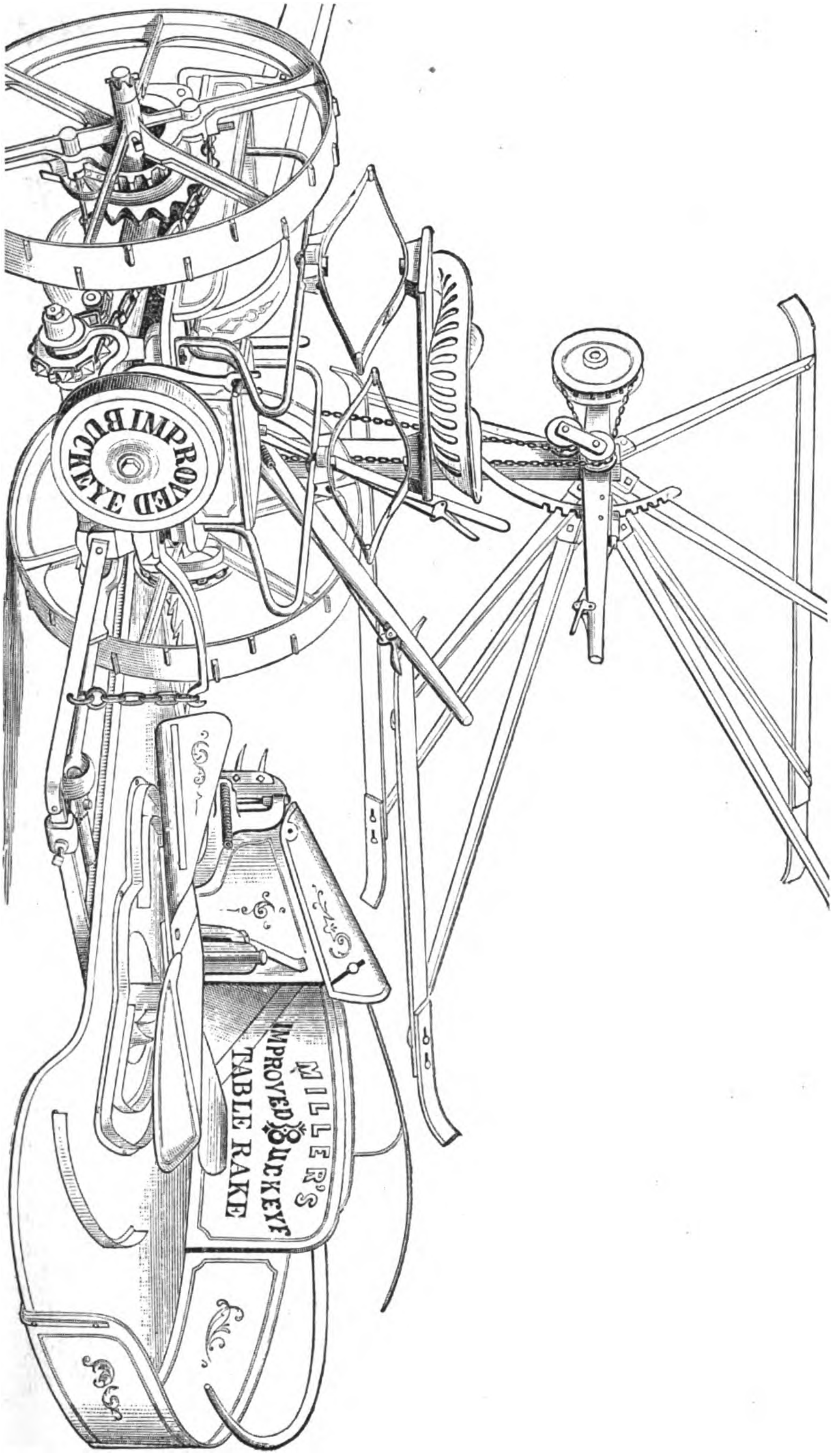
Fig. 4.

SUPPLEMENTARY NOTE BY DR. ALFRED L. KENNEDY.

Self Rakes.—The space in the Society's Transactions of last year devoted to Mowers and Reapers and to the Corn Harvester precludes the necessity for much description of them here. Improvements in the accuracy of the driving-gear, and in boxing it, so as to prevent injury by dust or blows, as well as in the lightness and general workmanship were conspicuous.

Sweep Rake.—Among the Sweep-Rake Reapers, was that shown by Messrs. W. F. LIPPINCOTT & SON, of Woodstown, New Jersey, and manufactured by Walter A. Wood, Hoosic Falls, New York. The rake is so geared that the driver can readily adjust it to rake off more or less frequently as the machine advances, and thus adapt it to fields where the crop is variable. Hence the gavels can be made of the same size where the crop is light as where it is heavy; where heavy, every alternate sweep can be set to rake off the grain from the platform; where light, every third, fourth, or fifth sweep may be made to rake off. The device by which this change is effected, is exceedingly simple and ingenious. It can easily be altered, and set by the driver without his leaving his seat.

Table Rake.—This Automatic Side-delivery Reaper, consists of an ordinary quadrant platform or table, with a fork on the end of a jointed arm, which sweeps around a vertical axis in the center of the table, so as to allow the fork to follow closely the surface of the platform. By means of a cam or track, fastened securely on the platform, the jointed arm is extended or shortened to suit the form of the table, so that the fork, starting into the grain close to the inside shoe, sweeps across the platform in a line parallel to the sickle, gathering and compressing the grain against the outside or circle board, delivering the gavel in a compact form for binding,


IMPROVED BUCKEYE
MILLER'S
IMPROVED BUCKEYE
TABLE RAKE

and entirely out of the way of the machine on its next round. The fork is entirely independent of the reel, and is worked by means of a chain and sprocket wheel, connected with the main shaft of the machine; and while it is so arranged as to work automatically, delivering a bundle every thirteen feet, it is always under control of the driver, and can be stopped or started at any point by means of a lever, worked by the driver's foot. In thin grain, and at the corners of the field, the bundles can be carried as far as desired before dropping. A stationery sheet-iron shield, some three feet in diameter, covers the center of the platform, preventing the straw from being caught in the gearing. The rake itself requires no adjustment whatever for the different conditions of grain. The cutter-bar can be raised or lowered while the machine is in motion, and in raising and lowering the bar, both ends are raised and lowered alike.

The overhanging reel used is, as aforesaid, independent of the rake, and can be made to move fast enough to do its work, without affecting the working of the rake.

The reel-arm is always parallel with the cutter-bar, and its motion is uniform the whole length of the bar. The reel puts the grain squarely upon the platform, and the rake compresses it into a bundle, and delivers it ready for binding. The bundle when gathered may be carried on the rear of the platform, around a corner, or as far as desired. Manufactured by C. AULTMAN & Co., Canton, Ohio.

Self-Binding Harvesters.—The form of reaping machine known as the *Harvester* has long been before the public. By means of it the grain is cut and made to fall upon a platform, the floor of which is of canvas and endless. This carries the grain to an elevator, by which it is taken up, over, and across the drive wheel to a table where two men, who ride on the machine, gather it into gavels, and bind them into sheaves. That the two men can do the work of five, who walk after the machine, pick up the gavels, and bind them, is, we believe, generally conceded, and hence, especially in the West, the Harvester became deservedly popular. But two men, in addition to the driver, so increased the weight that the demand for a Harvester, which would bind by machinery, became general, and the Self-binding Harvester is fast supplanting the original form. Many features of the latter have been retained. The endless web or canvas and the elevator, as well as the reel, have been so improved as to work with greater regularity and efficiency. The new device added is now known as the "self-binder attachment," and the Harvester has so favorably commended itself to the farmers of all the grain growing States, that manufacturers have found it difficult to supply the demand, and new inventions have multiplied rapidly.

Buckeye Self-Binder.—Among those not perfected and therefore not shown at the time of the Centennial exhibition, is the "Buckeye" machine, Fig. 56, is a general view of it. The self-binder attachment being shown separately, and more in detail in Figs. 57 and 58.

"The elevator consists of two endless canvas webs, with light bars of wood across at short intervals. As fast as the traveling endless floor of the platform brings the cut grain across, it is raised between the two endless webs and delivered side on down to the binder platform. The endless floor of the platform is driven by chain gear in the rear, as will be understood from the engraving, and the upper web is driven by spur gear at the opposite end, a spur on the lower roll gearing in a spur on the upper roll. The elevator slants obliquely over the main wheel, sufficiently far to direct the grain downwards to the binder platform, whilst three light curved steel rods, suspended from a cross bar, keep the flowing stream of grain in the

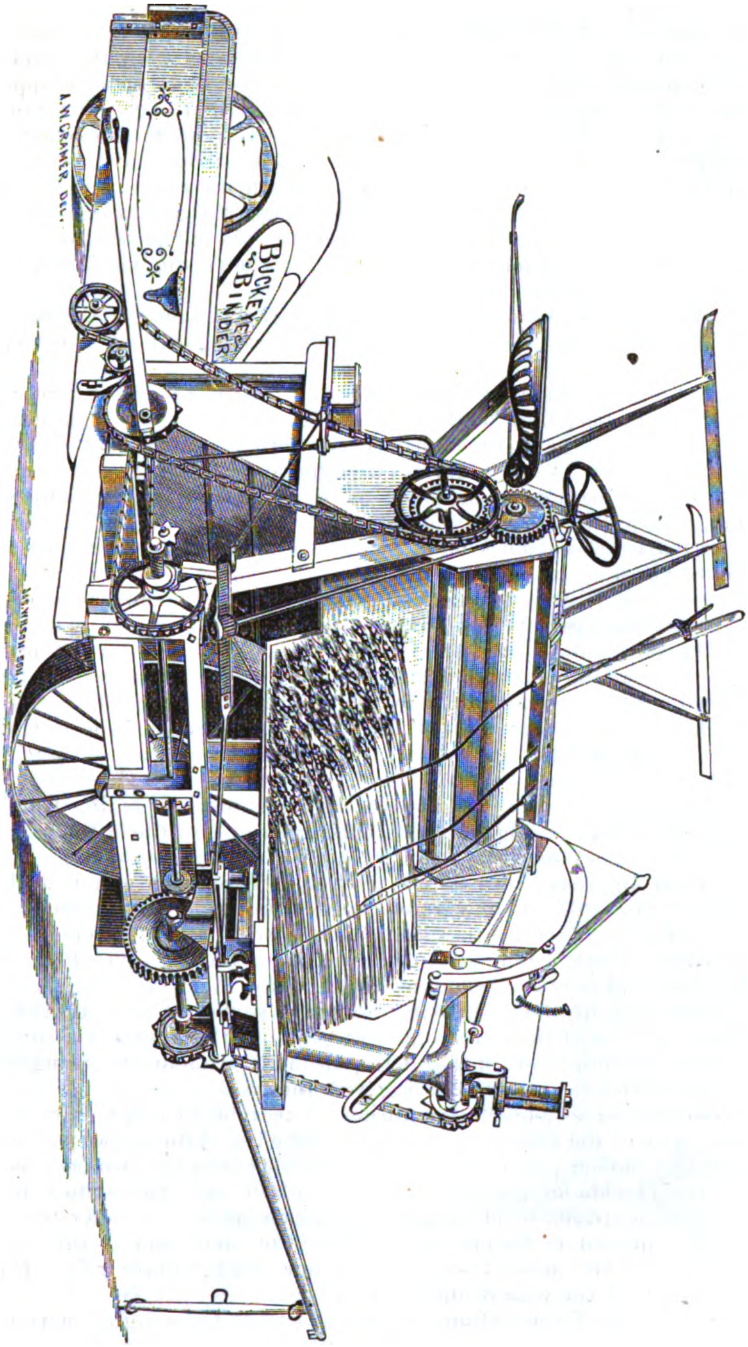


Fig. 56.

right direction, preventing it at the same time from being blown about in windy weather.

The platform of the binding apparatus has a traverse motion, so as to bind the sheaf in the proper place, be the straw long or short. This is effected by a hand-wheel lever at the top, near the driver's seat, with a small pinion at the lower end of its shaft which gears in a traversing rack-bar. The standard that carries the binder head and spool rises from the butt end of the sheaf, and the binding arms are actuated intermittently by an endless chain, with tension pulley. The lower chain wheel is on the end of the shaft of the large pinion, conspicuous below the platform. The whole of the binding mechanism is driven by chain gear in the rear, as shown in the engraving, the first motion being a small clutch chain wheel on the shaft of the large chain wheel that drives the elevator. This small clutch wheel can be thrown out of gear by means of a bell-crank pedal gear, operated by the foot of the driver, so as to regulate the size of the sheaf when the crop is of unequal thickness, and for turning at land's end. The bell-crank is behind the tool box under the driver's seat. The shaft of the lower chain pulley extends to the further side, and has in it a groove opposite the twister pinion and under the slot in which the binder-arm works, and upon this shaft a pinion with a feather in this groove slides, so as to accomodate the binding mechanism to the traverse of the platform. The change from rotary to reciprocating motion is effected by cam gear. The rack-bar that operates the twister, from which the wire arises, being driven to and fro by a rocking lever.

The gaveling breast or cradle into which the grain is collected to form a sheaf consists of two curved boards, between which is the open slot in which the binder-head works. These support the gavel as it is being grasped by the binder-arm, and drawn outwards to the twister, thus hindering the rubbing of the ears on the breast, and the threshing of the grain, and, as the standard is at the butt of the sheaf, the ears of the grain are not threshed out by coming against it. These are peculiarities, simple in construction, and efficient in action.

The wire from the spool passes over two pulleys, carried by spring tension take-up arms, the one next the spool being low, the other elevated. From the pulley on the long arm the wire is threaded over a pulley in the binder-head, and then down to the twister, in which the end is held fast. It will thus be seen that the wire is always outside the falling grain on the gaveling breast. This is a peculiarity that merits special attention. The binder-head in the cut is ready to descend and grasp the gavel, which is under the wire, between the head and the twister. When the head descends, the roller in it runs along the wire, carrying the wire with it, so as to surround the sheaf, and thus crossing that portion of the wire below, whilst the portion behind, between it and the elevated take-up arm, prevents the falling grain from being drawn along with the head, the head and the upper wire thus making a complete separation. This binder-head carries the wire into the jaws of the twister, below the outer edge of the platform, and, the moment this is done, the twist is made, the wire cut off, and the loose end held fast. The binder-head then rises, the roller running up the wire, outside the falling grain, to the position it occupies in the cut. As each sheaf is bound, it pushes off its predecessor from the platform on to the ground below. Under the spool there is a friction brake, driven with a friction strap, to prevent the wire running off too fast.

The simplicity of the self-binder attachment, and the facility with which it may be attached to the ordinary Harvester, are well illustrated in the two smaller cuts 57 and 58.

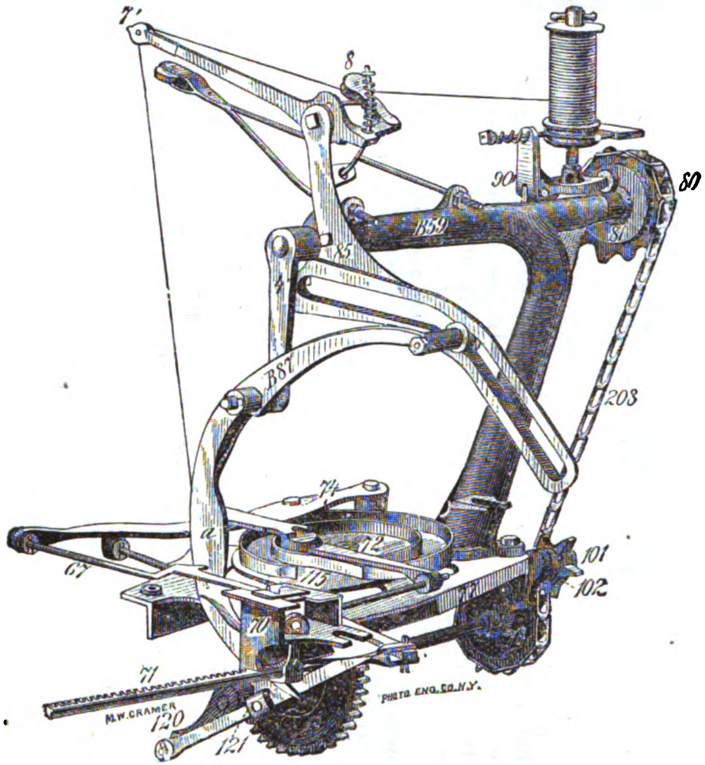


Fig. 57.

"Buckeye" Self-Binder Attachment.

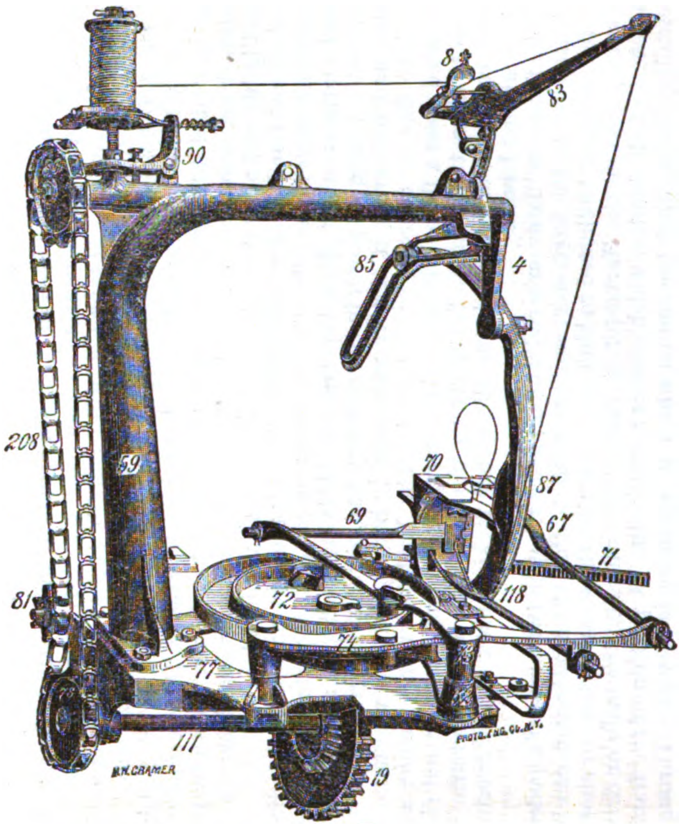


Fig. 58.

The arm (*59*) is tabular to unite lightness with strength, and it, as well as nearly all the other parts, are bolted to the bed-plate, (*77*.) When this is bolted into its place on the machine, but little adjustment of the gear, by which motion is taken from the latter, is required. The figures refer to the published list of pieces, which may be ordered for repairs. Manufactured by C. AULTMAN & Co., Canton, Ohio.

Magnets.—Certain western millers having complained that their bolting cloths were injured by fragments of wire carelessly left when the wheat was cleaned, science soon provided a remedy—the application of magnets to remove from wheat all bits of wire. The common horse-shoe magnets, the form of which is shown by Fig. 59, are used. Fig. 61, illustrates a gang of horse-shoe magnets used in the grain spouts of mills. The valuable service rendered by these magnets in removing not only pieces of wire, but nails and other iron substances, will probably render their introduction general. Manufactured at Chicago, Illinois, by the Electric Company.

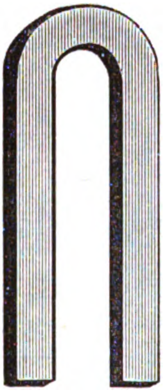


Fig. 59.

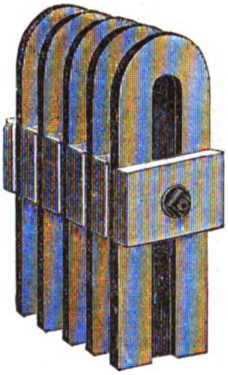


Fig. 60.

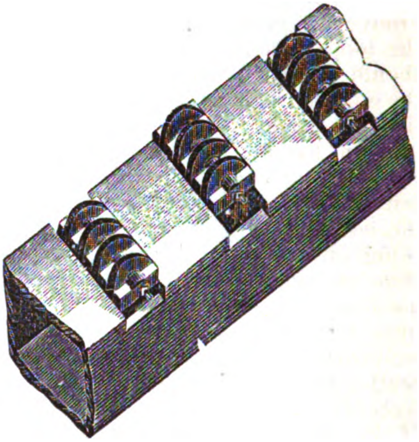


Fig. 61.

The *Self-binder* made by WALTER A. WOOD, and operated by W. F. Lippincott & Son, is widely and favorably known. It binds with wire, and the one exhibited differs in some minor details from that usually shown by the enterprising manufacturer. A description of the details would hardly be intelligible without cuts, and they have not been furnished.

Jenkins' Cord Binder Attachment.—This is the only machine for binding grain with twine in the exhibition, and its work was done so perfectly, as to attract a large crowd of pleased spectators. It is designed to be attached to a Harvester, taking its power in the ordinary way, gaveling the grain from the table, and delivering it tightly and securely bound, and this whether the cord be fine or coarse, dry or tarred. The binder-arm and tie-box are mounted upon a frame which oscillates carrying the binder-arm to and fro, so as to allow the grain to fall freely on the table when the binder-arm is again carried over and binds the sheaf, then rocking back and delivering the sheaf just bound.

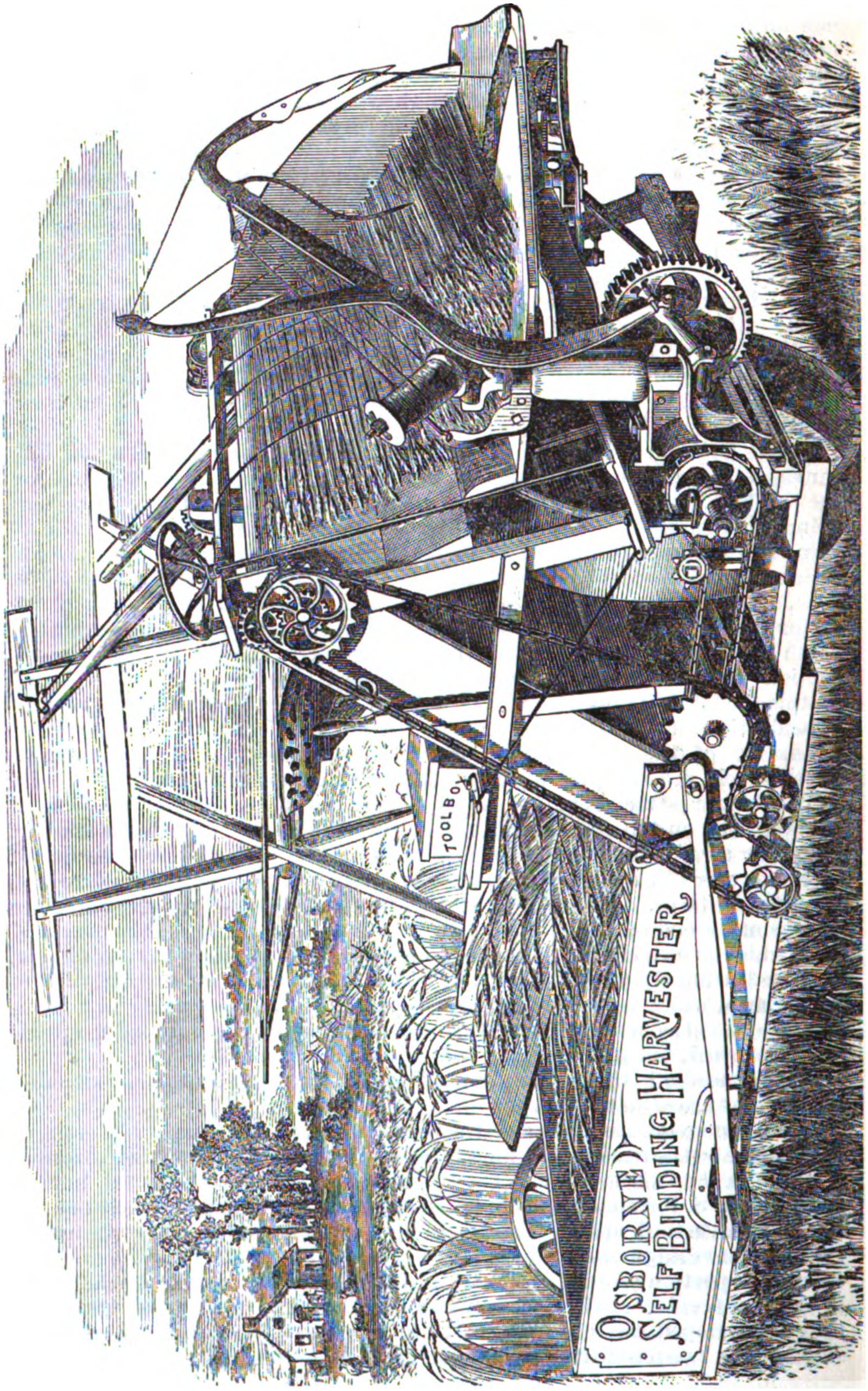
The frame oscillates on a rod which passes through two arms of a pedestal attached to the harvester, and arranged so that the binder-arm can be moved along, and adjusted to bind grain, whether the straw be long or short. A spur pinion on the Harvester operates a spur wheel on the main or driving shaft of the binder, which carries a crank-pin. A portion of the frame extending down below the rod on which it oscillates is slotted. Through the slot the crank-pin works, and by its revolution imparts a reciprocating motion to the frame. This motion is quickened as the leverage is shortened by the crank-pin approaching the rod or fulcrom of the frame, which is thus suddenly thrown out of the way of the grain coming on to make up the gavel. The binder arm mounted on the frame is operated by being connected with the crank-pin. It carries the cord-clamp and the nipper, which latter, by opening and shutting, is made to let go the cut end of the cord, and take up the continuous cord to the spool, and cut it. The loop is made in the tie-box, by means of a hooked spindle in the hub of a small wheel, and eccentric thereto. This is made to move round a central jaw where the cord is clamped. The hooked spindle is swiveled to a reciprocating arm, whereby it gets its vertical motion in making the loop. By means of a groove in a crown-wheel, which moves the small wheel containing the hook, the loop is completed. The spool can be placed close to the tie-box, and should the band break near the box, the tier will thread itself. Tension on the cord is regulated so as to bind tightly or loosely. During the exhibition, the machine was operated by the inventor, Mr. E. W. JENKINS, of Norristown, Pennsylvania.

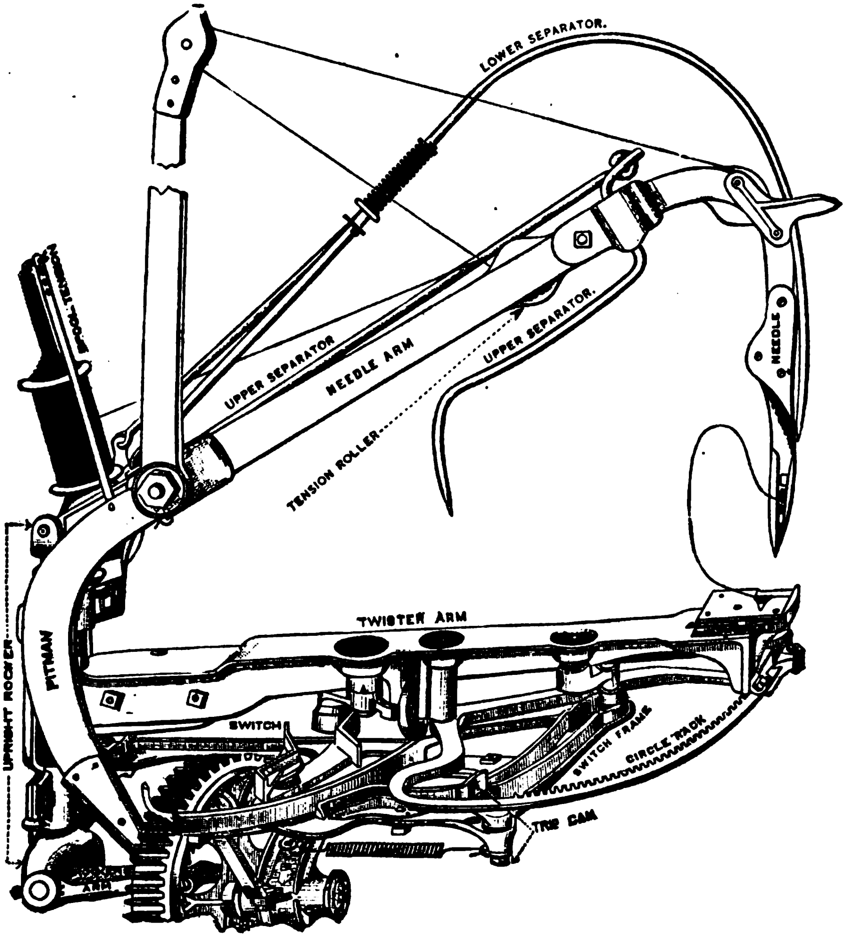
In the *Osborne Self-binding Harvester*, the grain which falls upon the canvas platform is carried sidewise to the elevating belts, and delivered to the self-binding attachment, as shown in the engraving. The cutting-bar being on one side of the driver, the binder-table on the other, the machine is balanced, as it were, on its single drive-wheel. This wheel has an inside spur-wheel cast on it, which gives motion to a spur-pinion. This, in turn, actuates a bevel-pinion on the crank-shaft, the pin of which imparts reciprocating motion to the connecting-rod in the rear of the platform, beneath which a " vibrator " drives the cutting bar. The driving gear is essentially that of the " Kirby " mower, described, page 380 of the last volume of this Society's Transactions, as the type of Class I, sub-class *a*, of the classification of mowers and reapers therein published, the driving gear consisting of the following elements: 1, spur-wheel; 2, spur-pinion; 3, bevel-wheel; 4, bevel-pinion; 5, crank-pin; 6, connecting-rod.

The binder attachment, as shown in the cut, takes its motion from a chain pulley on the crank-shaft, which, by an endless chain, drives a similar pulley on a counter-shaft, placed nearly under the binder-table. The counter-shaft carries a spur-pinion, which is geared into a spur-wheel directly beneath the table. A crank-pin in this wheel drives the rocker arm, Fig. 63, the other end of which is hinged to the upright-rocker. The treadle-arm, which is swiveled to a support near the lower end of the spool, has its base [strangely marked " pitman,"] resting in a socket on the end of the rocker-arm, which is attached to the crank-pin of the spur-wheel last mentioned. By the revolution of this wheel, not only is the needle raised and depressed, but it is made to swing round horizontally.

As the needle is thus swung round towards the elevator, it is also depressed towards the twister.

From the spool, the course of the wire can be traced to the tension-roller, and thence to the needle, by which it is carried round the gavel and through the hole in the twister-plate to the twister itself. This is of steel, in the shape of an S, forming a double hook, set horizontally, and attached at its center to a vertical shaft. The portion of the wire which comes from the twister-arm rests in one of the curves of the double hook, and, as the needle enters, its portion of wire is lodged in the other curve of the hook. The hook then revolves, twisting the wires tightly round each other, instantly they are clamped, the ends cut, and the needle, as it rises, throws off the sheaf. The twister-shaft, at its lower end, carries a small pinion, which is

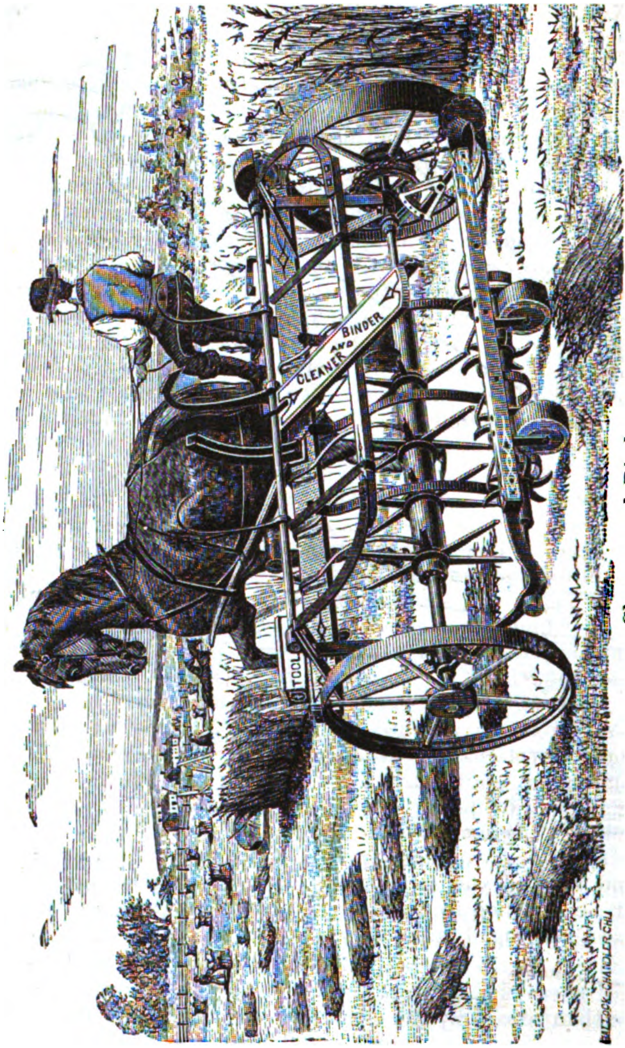

OSBORNE
SELF BINDING HARVESTER
TOOL BOX



operated at the proper moment by the circle-rack. Annealed steel wire, No. 20, running about three hundred feet to the pound, is used. Each spool, as furnished, contains fifteen pounds—sufficient, in ordinary grain, for from five to seven acres, the quantity, of course, depending on the size of the sheaves, from one quarter to one third more wire, per acre, being required to bind small sheaves than large ones. It is claimed that the cost of the wire is more than repaid by the clean and perfect manner in which the machine does its work, cutting more than five men can bind, and binding it, with none of the waste that characterizes hand-binding. If left to itself, the binder will make a tightly-bound sheaf every twelve feet; but, by means of a foot-trip, the driver can regulate the size of the sheaves. He can also readily adjust the machine to bind long or short straw.

Four sizes of the Osborne self-binder are now manufactured at Auburn, New York, with cuts of six, seven, eight, or ten feet, respectively. The latter is specially designed for the large western wheat fields, and the claim is made that, with it, when it is drawn by four horses, a man will cut and bind fifty acres a day.

Gleaner and Binder invented by Mr. M. G. HUBBARD, Norristown, Pennsylvania. This new machine is intended for farmers who use a Reaper, and who do not wish to purchase a self-binding Harvester. The Gleaner and Binder is mounted on two wheels, is easily drawn by one horse and managed by a boy. It gathers up the cut grain which is lying, scattered as well as that which lies in swaths after the cradle or in gavels after the self-rake reaper, and when sufficient has been gathered, it automatically binds it with wire into a compact sheaf. The needle-arm working at right angles with the axle, carries the wire over the gavel to the twister, where it is securely twisted and then cut, and the sheaf falls behind the machine. This is, of course, entirely independent of the reaper, and grain cut too green or too weedy or grassy to bind at once, may be left to dry and bound when fit. The machine gathers more rapidly and completely than is usually done by hand. It can be operated as readily as a horse rake, and by means of a lever is easily controlled by the driver. Manufactured by the Norristown Grain Binder Company, of which Mr. William M. Singerly is proprietor.



Gleaner and Binder.

MR. THOMAS G. JANVIER'S REPORT RESUMED.

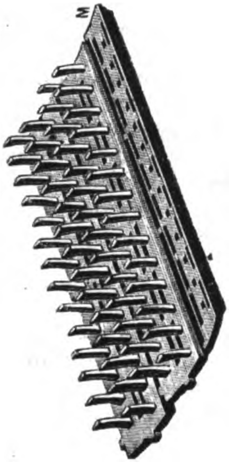
GROUP XXXIX.—Preparing Products for Market and Consumption.

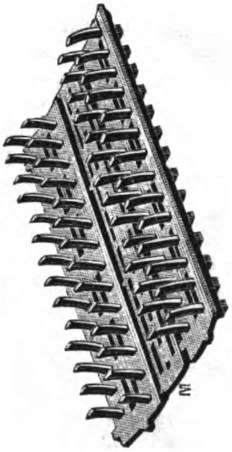
In the *Thresher* of A. B. **Farquhar**, York, Pennsylvania, the cylinder is made of the best wrought iron, with wood filling to give elasticity; the teeth of Swede iron, threaded and fastened in with nuts. The shaft is of steel, runs in self-oiling, anti-friction metal boxes, and is suited to either belting or gearing. The concaves are adjusted to the cylinder by a self-sustaining cam, and can be moved up or down while the thresher is in motion. They are perforated, which permits the threshed grain to pass through to the conveyor. The spikes are interchangeable, and secured by nuts. The separator attachment is constructed on the vibrator principle; the parts are supported on swinging hangers, and so adjusted that they balance each other, allowing the machine to set very steady. The fan has a self-regulating blast, easy movement, and does perfect work. The separation of the grain commences in front of the concaves, and continues to the extreme end of the thresher. The tailing elevator is made with dirt and cockle screen attachment, and returns to the cylinder all unthreshed wheat-heads and white-caps.

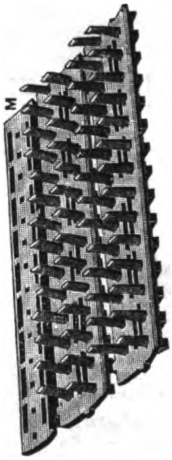
The *Young Chief Thresher and Separator*, manufactured by **Aaron Wissler**, Brunerville, Pennsylvania, has an iron bar cylinder, adjustable cast-iron concave, and wind boards inside, adjustable from the outside by means of a lever. The most prominent feature is the fan regulator, for giving it a uniform speed, and this independent of the threshing cylinder. It is done by means of a scale beam or lever, with a weight attached to act upon the belt which connects between the cylinder and fan pulleys. If this weight is extended it tightens the belt, gives more speed to the fan and increases the wind; if it is moved back, the belt is slackened, the speed diminished, and the wind lessened. To the other end of the fan shaft is attached a side-gear, to operate the sieve and steps by means of spring beaters, these harmonizing with the speed of the fan. The steps are notched, making a rough surface for holding a certain quantity of grain, preventing it from dropping on the bare boards of the steps, keeping it from bouncing and being carried to the chaff with the wind. By this arrangement there are four cleanings: from shute to first step, first to second step, from second step to the sieve, and then through the sieve. The straw-stacker can be attached to deliver the straw sideways, and at almost any angle desired, making it admirably adapted to threshing in barns.

Nichols & Shepard Company, Battle Creek, Michigan.—In this *Thresher*, which is a Vibrator, the cylinder is provided with center heads, giving great strength and durability. It has boxes of new and improved pattern, provided with adjustible beds. The shaft is of steel.

Concaves.—There are two concave pieces, each containing two rows of teeth, and a blank concave or narrow grate, which can be placed as required, either before, behind, or between the two concaves. The result of placing the grate in front, is that the cylinder takes grain faster, making it convenient for threshing rakings. Placing it in the middle favors clean threshing, but not with the same rapidity as in the first position. With the grate in the rear, all the concave teeth are brought forward of the



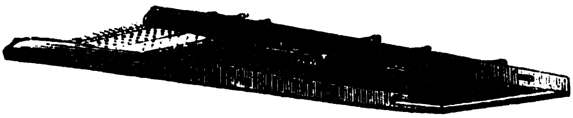




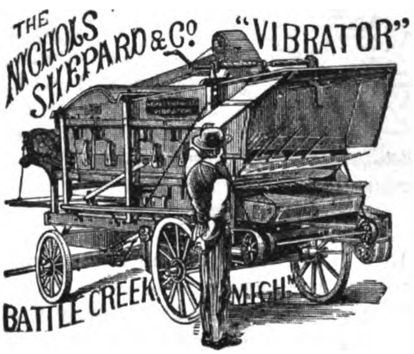
center of the cylinder, which is very desirable for long, limber, or bad conditioned straw.

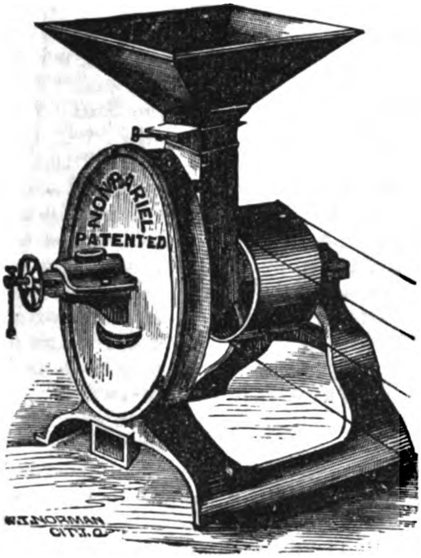
Overblast Fan.—By its construction, the blast is delivered mostly above the seives, the grain being nearly cleaned before striking the latter.

The separator parts or shakers are made of thoroughly seasoned wood and wrought iron, and suspended on wrought iron swing rods. The upper shaker consists of finger bars, fingers, and transverse slats, so arranged as to keep the straw thoroughly tossed and shaken as it passes along, the grain dropping to the lower shaker.



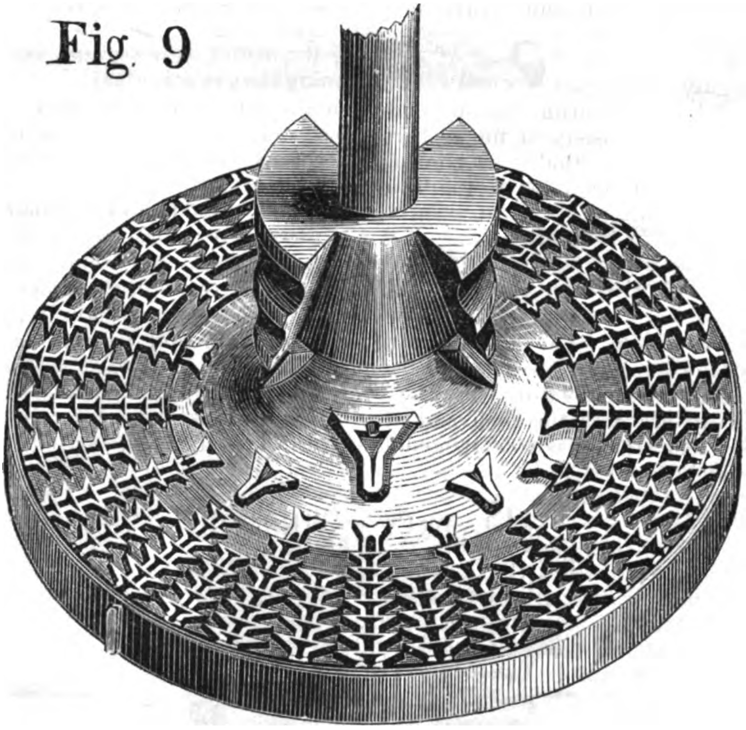
The lower shaker carries the grain to the rear end, where it passes through the holes in a regular shower upon the sieves below. The deck or cover extends over and beyond the tail end of the shoe, and at each side is hung a hinged chaff-board. This arrangement, in connection with the canvas side-wings and stacker sides, effectually prevents the chaff and straw from being scattered out by side winds. The stacker is so arranged, that it can be folded and carried on the machine.



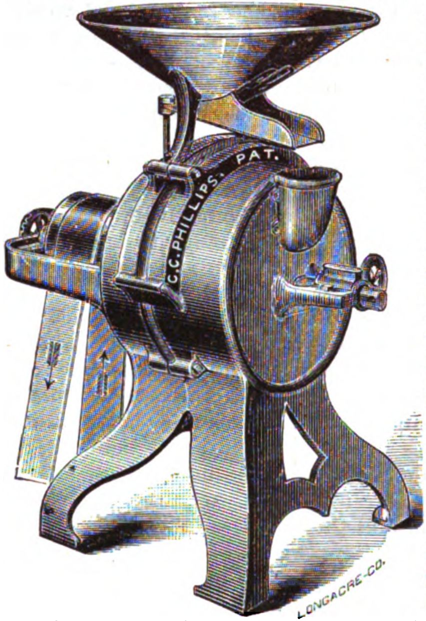


J. Sedgebeer, Painesville, Ohio, exhibited the ***Nonpareil Crashing and Grinding Mill.*** It is strongly made, is powerful in its operation and very durable; the frame is cast in one piece. By removing the hopper and substituting for it the cob tube, corn in the ear, ginger, calcined bones, &c., can be ground. Fig. 9, shows the dress with crusher and shaft. The crusher runs in a strong cast-iron box, and the inclination of its jaws—which are twice as wide in front as in the rear—serves also as a conductor to convey with great force all material towards the plates. The crusher is cast with the running plate, giving great strength and power. The teeth are Y shaped, and made of the hardest chilled iron, the lower part of each one in its row connecting with the upper part of the corresponding tooth in the row below. By this arrangement the pulverized material is not only ground, but also forced to the periphery or grinding edges. The teeth are raised over an eighth of an inch above the plane of the plates, and are self-sharpening. As they become dull on one side, the mill is reversed, and the

Fig. 9



sharp sides do the work, operating equally well either way. The grinding plates can be easily taken out and replaced with new ones, which is not necessary until the teeth are completely worn off. By means of a set screw, it can be made to grind fine or coarse as desired.


C.C.PHILLIPS. PAT.
LONGACRE-CO.

C. C. PHILLIPS, Philadelphia, exhibited an excellent *Grinding Mill.* The case and frame, each half cast in one piece, each respective half fitted to the other with rabbit-joint, and when brought together and secured by registering lug bolts, must always occupy the same position, forming comparatively one piece. The scroll extends around and projects out from the case, securing perfect freedom of discharge, drawing a strong current of air through the burrs, preventing their heating, at the same time cooling the product. The shaft and bridgetree box are so constructed that the bearing end which receives the pressure in grinding is constantly running in oil. The end of said shaft is supported by a strong bracket, arranged to attach a belt from any direction. The device of screws and fan for cleaning the grain is abmirably adapted to the purpose. The hand-wheel, in connection with adusting-bar inside of bracket arm, furnishes the attendant the means of adjusting the grinding burrs from either side of the mill.

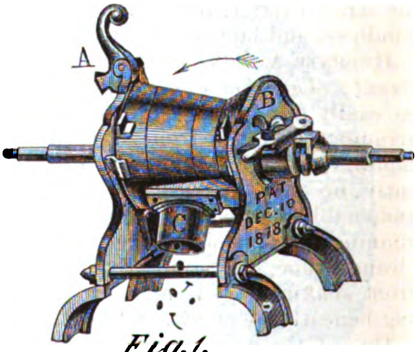


Fig. 1.

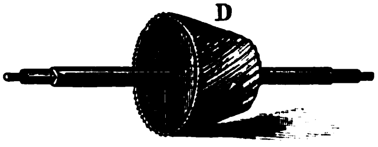


Fig. 2.

J, C. DELL, Philadelphia, exhibited a most complete and admirable *Grinding Mill*, for coffee, spices, &c. The shell or bed of the burr is so constructed that the inlet spout *C*, can be overturned to discharge any nails, stones, &c., that may get into the hopper. The fastening, *A*, holds the shell in position, and can be readily released when required. The grinding burr, *D*, fits loosely on the shaft, and is connected with it by a spring, *E*, in such a manner that if any obstruction gets between the shell and burr, the latter will stand still while the shaft continues to revolve. This prevents all danger of breakage to either shell or burr. By means of the lever and screw at *B*, the mill, whether running or not, can be set to grind coarse or fine. The important parts are made of steel and hard metal, and the bearings fitted with anti-friction boxes.

In the *Thresher* of HELSHIZER & LARZALERE, Doylestown, Pennsylvania, the cylinder shaft is made of the best steel, and runs in babbitted boxes. The center head and band are such that all expansion of the cylinder, by centrifugal force is obviated. The staves or bars which hold the cylinder teeth are made of hammered wrought iron, drilled and reamed to an exact size, corresponding with a taper tooth, which is prevented from turning by a feather of novel construction. The concave is made of wood and iron combined, each tooth being held in position by a nut. It has the improved slat shaker bottom, starting close behind the cylinder. This, with the new six-bar twin-tooth rake prevents the grain from being carried over with the straw. In their No. 2, machine the concave is of malleable iron, and made in sections; the teeth being adjustable and so constructed that they can be set to or from the feeder, as the condition of the grain may require. They are also made reversible, which gives them double wear. The cylinder teeth are also reversible.

GEISER MANUFACTURING COMPANY, Waynesboro', Pennsylvania.—In this *Thresher* the cylinder is made with a hard oak beater, staggered teeth, and the pulley end of the shaft supported with extra box and braces. The beater is first lined with sheet iron, then a plate of one eighth inch iron put on the face. The teeth are then secured by nuts, by this arrangement they are made very firm, at the same time have elasticity enough to prevent them from jarring loose. The concave is made of wood, with a plate on the face and the teeth running through. It is adjusted by a lever acting directly on a roller, with a fulcrum, and held by a ratchet. The separator consists of sets of reciprocating rakes; the straw and grain being raked from the cylinder by the first set, and then passed under them, all the bunches being thoroughly separated before being thrown on the second set, where the straw moves along loosely, and the grain is fed into the shoe. The cleaner consists of three grooved rollers, with dividing shelves, over which the grain passes in thin sheets, with the blast acting against the under part; by means of a regulator, a continuous and steady blast is kept up. The elevator is so arranged with a trough and net that the tailings are conveyed back to the thresher under the feed board. By loosening the joint in the straw carrier, and turning the outer end over, it can be run back by the windlass, and lapped over the top of the machine.

HEEBNER & SONS', Lansdale, Pennsylvania, have improved their "*Little Giant*" *Thresher and Cleaner*. The concave is so constructed that it can be easily and quickly adjusted while the machine is in motion. It is so arranged with the iron thresher sides that it takes straw with ease and rapidity, relieving the feeder of much work. The cylinder runs independently, no other part of the thresher being run from it, thus saving power and enabling it to get up speed quickly. The separator shaft has two cranks running in opposite directions; one works the separator the other the cleaner shoe, one counterbalancing the other and preventing the machine from shaking. It is also provided with three sets of beater forks, working beneath the straw, and beating out all the grain from it.

One of the most prominent exhibits of *Scales* was that made by RIEHLE BROTHERS, proprietors of the Philadelphia Scale and Testing Machine Works. Among the many articles displayed, none is more worthy of close examination than their government standard *testing machine* for applying strain to all kinds of material by tensile, transverse, and crushing strains up to forty thousand pounds. The power is applied by a three-plunger hydraulic pump, worked by hand. The specimen under test is secured by means of proper grips between the power and weighing mechanism, the strain being thereby transmitted, through a system of levers, to a weighing-beam, on which the test is registered. The power, when applied, causes the weighing-beam to rise, the poise on which is then moved to restore the balance.

This operation is continued until the specimen is either broken or strained to a sufficient degree. Machines of this nature are made up to three hundred thousand pounds capacity. Their *furnace-charging* scale has seven beams, all inclosed in a beam-box, and so arranged that no one knows how many pounds each one is intended to balance. The poises are set by the weighmaster, the movement of the beam being indicated by a pointer, which passes through the front of the beam-box, and is put in and out of operation by a latch. Either of the seven beams can be used saparately, or all conjointly, with the weighing platform, thereby doing the work of seven scales. Their handsome dormant *warehouse scale*, taken from stock, showed the style of finish for custom use. Part of a large order for the Russian Government was shown, consisting of a parallel compound crane-beam, capacity twenty thousand pounds, marked to weigh by poods, the Russian weight, and intended for weighing heavy castings from a crane or derrick. This firm is making a similar machine for the same government with a capacity of one hundred and twenty thousand pounds.

The *Scales* displayed by FAIRBANKS & Co., Philadelphia, seemed peculiarly adapted to farm, dairy, and general purposes, the most prominent feature being the *hay* and *stock* scale. In this the platform is suspended from castings bolted to the corners of the frame around the pit; to said castings the check-rods are also attached so that any unequal settling cannot cramp the levers or platforms. The long ends of the levers transmit the strain through pointed pivots, said points being in a vertical line with the two long levers, so that any unequal loading of the platform would have no tendency to twist or cramp the action of said levers. By the use of the check-rods all oscillation of the platform is avoided, thereby preventing wearing of the pivots and bearings and contributing to the durability of the scale. There are over forty thousand of these scales in daily use in different parts of the world. Fairbanks & Co. make over eight hundred different modifications of scales.

PRIEST, PAGE & Co., Philadelphia, had on exhibition a fine display of "*The Improved Howe Scales.*" The improvement is mainly in the reduction of friction and protection of the pivot bearings or knife edges. In the platform scales all check rods are done away with, while between the platform and knife edges are placed chilled iron balls for preventing the pivots from becoming dulled, so they can be used many years without sharpening.

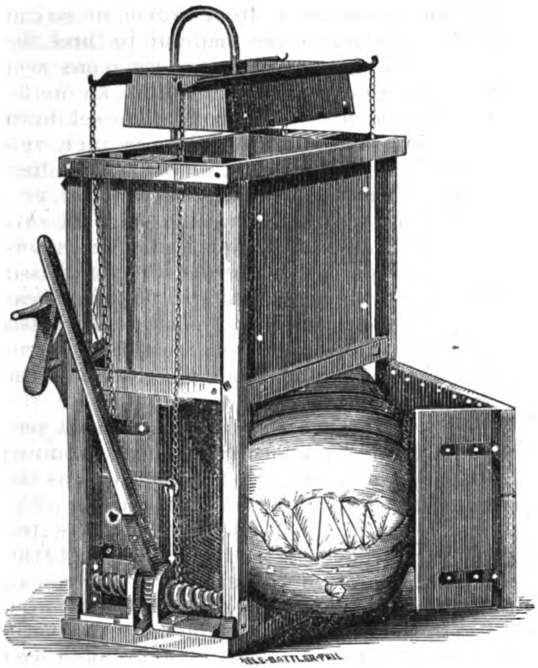
The improvement in counter scales consists in protecting the bearings from dust and dirt, by means of a cap completely covering them.

A *leather dealer's* scales, twenty-five hundred pounds capacity, attracted particular attention. This stood on high wheels, with a vibrating axle, and had a large folding platform, on which whole sides of leather could be weighed when opened their full size. It had a graduated counterpoise for telling at a glance, and without handling, the exact number of weights placed upon it, and it was so sensitive that a handkerchief placed on the platform would turn the beam.

The dormant scale for general use by wholesale grocers and others was conspicuous for its handsome pillars and cap, double brass beam, with sliding poise, and graduated counterpoise.

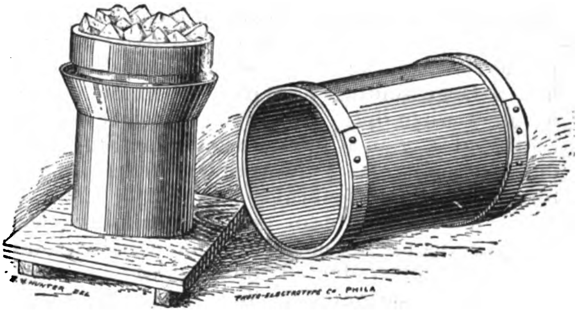
The construction of the *four ton wagon* scale is such, that motion is imparted to the platform while being loaded, making it very desirable for a hay or coal scale. As being necessarily exposed to the weather the driving on to the platform instantly dislodges ice and all chance obstructions.

The catalogue of this company embraces every variety, from a letter balance to the largest railroad track scale.



The *American Hay and Cotton Press*, shown by B. S. GODDARD, Philadelphia, is very complete, and perfectly adapted to all the baling purposes of the farmer. It consists of a strong box inside of, and fastened to, a substantial frame work. The presser-block, in box form, is shown at top of cut, with the two iron bars. To these are hooked the chains, having their lower ends connected with spiral cone windlass at each end of the press, and operated by means of a lever and ratchet. As the presser-block descends, the projecting bars pass through openings in each end of box. Said block is raised by a rope passing through the hollow iron davit, and attached to a windlass fastened to rear of press. The doors are so constructed that they can be thrown open in order to bind or sew the bale in sacking.

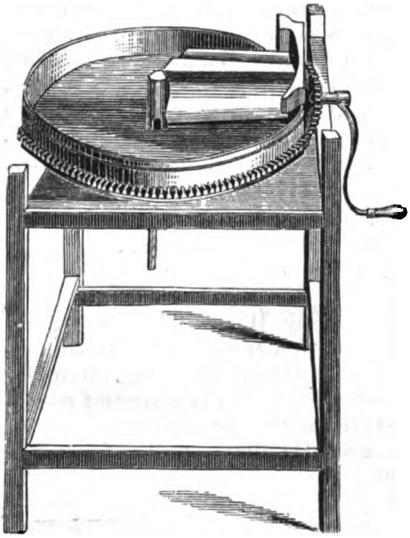
BOOMER & BOSCHERT, Syracuse, New York, exhibited a *Power Cider Press and Apple Mill* in operation. The press has a cross-screw, with double leverage threads so adjusted as to descend with a slow motion, which is so evsential to the thorough extraction of the juice. When the press has reached the proper point, it stops itself, and rises five times as rapidly as it falls. The apple mill comprises a grater cylinder, with a number of sections of knives adjustable by two screws. The feed is regulated by a spring jaw. By a movable door in the center of the pulp receiver, it can be fed at either end.



In the following cut is shown the complete *milk cooler and creamer* of WILLIAM DRIPPS, Coatesville, Pennsylvania, which was in operation during the fair. By using ice on top of the can containing the milk, the temperature of the latter at that point is kept at about forty-five degrees, while at the bottom of the can it is the same as the atmosphere of the room. By this means, the up and down circulation of the milk, is obtained as it passes to the top, the cream in it becomes chilled, and, being the lighter, remains there, the milk, being chilled, becomes heavier, and sinks to the bottom; the operation being continued until all the cream is at the top. Milk is a great absorbent of impurities from the atmosphere, but by this arrangement this is prevented, as the milk is placed in the can as soon as possible after milking, the cover with ice-box put on, and the jacket placed over all. This can requires one and three fourths pounds of ice to raise sufficient cream to make one pound of butter.

BROWN & SPEAKMAN, Coatesville, Pennsylvania, exhibited a *Churn*, known as "Pride of the East," of improved construction, in which the cream is agitated in a rapid and effective manner by the admission of a suitable quantity of air during the process of churning. It is oblong in shape, provided with a longitudinal shaft revolved by suitable gear-wheel mechanism. The revolving shaft is provided with a number of radial arms or beaters, alternately arranged at right angles to the adjoining ones, made with bifurcated ends, flat on one side and with sharp edges or ridges at the other side. When the shaft is revolved so that the ridges beat against the cream, the latter is broken, an action aided by the stationary breakers arranged at both sides of the churn. When the shaft is turned in the opposite direction, the beaters act with the flat sides against the cream and serve to gather the butter at the bottom of the churn. The breakers are made triangular shaped, tapering from the bottom to the top, the front edges being arranged to fit between the bifurcated beaters. The number of breakers is equal to the number of beaters, one half being arranged at each side of the churn. The bottom of the churn is made concave for the gathering of the cream and more effective action of the beaters thereon. The air is introduced by means of a fan arrangement with a hollow shaft, the latter revolving by an outer pinion, gearing with the driving crank-wheel; the air issues through the recesses or perforations at the inner ends of the shaft to the wings of the fan, and is forced through the spout of the fan casing to the lower part of the churn. The knob of the churn, in the lid, is provided with an exit opening for the passage of the air.

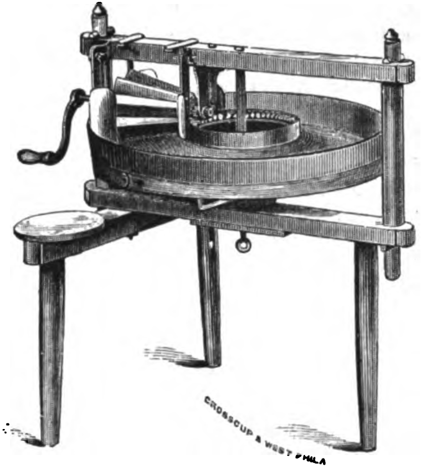
The *Lilly Patent Butter-Worker*, manufactured by C. H. R. **FRIEBELS**, Philadelphia, is composed of a circular concave tub on a stand constructed for it. The tub is made to revolve around an iron post with a perforated base by a crank and gearing, which at the same time revolves a three-bladed wooden ladle, each blade shaped like the back of a hand-ladle. This ladle in revolving, parts the butter so that the buttermilk can run down to the center and out through the base of the center post, at the same time compressing the butter behind it, causing it to lay in rolls around the tub. As the tub revolves the ladle cuts across the rolls diagonally, thus insuring a constant turning, mixing, and compressing of the butter. The iron center post is covered with a wooden cap so that no metal is exposed to the action of the salt or acid in the butter. For mixing the salt its action is complete and thorough. All the working parts can be separated and put together readily so that it can be easily cleaned. The entire machine appears to be compact and strongly constructed.



P. EMBREE, West Chester, Pennsylvania, made a fine display of *Churns, Butter-Workers, &c.*

The churn is barrel shaped, the case and slots rotating. The slots or breakers lift or carry up the cream, then allow it to drop, producing a strong concussion, and in this manner make the butter. The lever horse power for operating this churn is well made and simple in construction.

The butter-worker consists of a revolving cedar-wood table, with a convex surface on which the butter is placed, and then pressed by a fluted roller moved by a lever handle. At the opposite end of the roller-shaft is a small pinion which works into a gear around the center of the table, causing the latter to revolve. The liquid escapes at an opening in the edge of the table. The roller can be easily taken out and cleaned.



CLEMENT & DUNBAR, Philadelphia, made the largest and finest display of cedar ware in the fair, consisting of *Churns*, *Ice Cream Freezers*, *Tubs*, *&c.*

The AMERICAN FRUIT-DRIER MANUFACTRIG COMPANY, Chambersburg, Pennsylvania, exhibit a *Drier*, the trunk of which consists of a series of flues, one end resting upon and over the furnace, with the other end elevated at any desired angle. The first or upper flue contains one or more lines of trays, which move on sliding tracks. This flue is, automatically, always the hottest part of the evaporator, and receives the trays, successively, directly over the furnace, in its direct and greatest heat, the insertion of each tray pushing the previous one up the incline. The currents of dry, hot air strike each tray separately, and the combined currents, loaded with moisture, pass out of the flue, above the fruit, without coming in contact with it. The second, third, and succeeding lines of trays are in decreasing temperatures. The ratio of moisture in the fruit, and the temperature of the position it occupies in the evaporator, and which it requires, is exactly maintained throughout. From fifty to seventy-five per cent. of the water in the fruit is taken off and discharged during its progress through the first flue. The advantages of this evaporator are: First, The greatest and most direct heat upon each tray is upon its entrance. Second, Entire freedom from the vapor of all those subsequently inserted. The fruit does not become discolored by cooking or steaming; but comes out as bright and with as fine flavor as when first put in.

The "*Mother Carey*" *Incubator* exhibited by H. B. TATHAM, junior, Philadelphia, consists of a box, packed similar to a refrigerator, in the top of which is a pan containing water, and beneath this the hatching chamber, containing trays holding the eggs. Beneath these trays is a second pan of water for the purpose of supplying moisture to the air around the eggs. The water in the first pan is warmed from a small boiler outside of the box, and attached to it by pipes, having beneath it a gas jet or small lamp. In the box is an arrangement of flues, which furnish a constant yet moderate circulation of air, but not sufficient to disarrange the heat. The heat, which is thrown from the upper pan upon the eggs, is kept at a uniform temperature by means of an automatic regulator. The regulator used for gas consists of a horizontal glass tube inserted in the hatching chamber, and filled with any expansive fluid. One end of this tube is closed; the other, which is outside of the incubator, is joined to the top of a glass bulb containing mercury, and connected from its base to the base of a second and similar bulb of mercury adjacent to, and on the same level with it. The top of the second bulb is connected to the lower end of a vertical glass tube, from the top of which two tubes branch off, the three tubes forming the letter Y. One of the upper tubes is connected with the supply gas pipe, and the other with the pipe leading to the burner, causing the gas to pass through the branches of the Y. The fluid in the hatching chamber tube is heated in the same degree as the eggs, and, expanding, presses on the top of the mercury in the first bulb, causing it to press on that in the second. The mercury in the second bulb is so proportioned that it reaches the intersection of the Y tubes, and stops the flow of gas, when the desired temperature is obtained in the hatching chamber. A small stationery jet from a separate pipe burns close to the main burner to re-light it when the flow of gas begins again, which occurs as soon as the mercury falls by contraction below the intersection of the Y tubes. The regulator for lamp or stove is arranged by means of the mercury bulbs, tubes, and a lever attachment.

GROUP XL.—TRANSPORTATION.

In the Transportation Department, the display was very fine.

EDWIN HART, Philadelphia.—This exhibit consisted of three *Shifting-Top* and one *No-Top Buggies*. All were handsomely painted and finished in the best manner. This was the only collective exhibit confined exclusively to this style of carriage, and presented a very fine appearance.

The exhibit of **WILLIAM D. GARDNER**, Philadelphia, was a very creditable one, not prepared especially for exhibition; but taken from stock in the warerooms. In consisted, first, of a *Six-Passenger Coupé Rockaway*, neat and artistic in design, affording ample room, yet light in appearance and construction. Second, A *Six-Passenger Phæton* of entirely new design, with a movable center seat, so arranged that it can be used for four or six persons, being complete for either number. Third, A *Four-Passenger Phæton*, on three springs. Fourth, A *Physicians Phæton*, very strong and substantial, yet light in appearance, the front wheels turning to the wing-stay instead of wear-plate, permitting it to turn in a very small space. These carriages were all handsomely finished throughout.

McLEAR & KENDAL, Philadelphia, exhibited six *Pleasure Carriages* of the latest designs and improvements, with fine leather curtains, cloth-lined, handsomely painted, and unsurpassed for elegance, strength, and durability. One " Aldine " four passenger no top, on Whitney springs. One O. G. extension top phaeton, four passenger, with falling or shifting top. One sash open front. One low-door boat, four passenger, with standing top. One jump seat, and one buggy.

The display of *business* and *other wagons* by **GEORGE LEUGERT & SON**, Philadelphia, was well worth noticing. A handsome transfer coach, with improved ventilation, and a lamp and reflector answering as a head signal and inside light. A transfer baggage express, with shelving sides and a patent gate lock, doing away with the chain and strap. A regular business wagon, for provisions, &c. A handsome milk wagon. A large barrel or flour truck, made to bed twenty-one barrels.

SAMUEL R. PHILLIPS, Philadelphia, made a magnificent display of *Harness and Saddles;* also, a pair of wooden model horses, life size, handsomely carved and painted, one equipped with gold mounted, and the other with silver mounted harness. The saddles are made on leather trees, with steel springs, and so constructed that they adjust themselves to any horse.

The display of W. C. **BARKER** & Co., Philadelphia, consisting of *Wicker*

Baskets, *Fruit and Poultry Crates*, *Cedar Ware*, *&c.*, *&c.*, was very large and attractive. In wicker baskets, one hundred different styles were shown, varying in size from half a pint to fourteen bushels; also, a novelty in coops for shipping live poultry, consisting of large shallow baskets, with bows fastened in them, and these covered with wire cloth, making a very complete arrangement.

DEPARTMENT V.---Farm, Family, and Popular Improvement.

By C. Henry Roney, C. E., Superintendent.

It was intended to give a brief résumé of the most important improvements which had been made since the United States Centennial Exhibition in 1876; but space will only permit it to be done in a few cases where the judges have omitted details in their reports.

Exhibitors too often forget that the moral and intellectual improvement, and bodily health and comfort of the farmer and his family deserve equal consideration with that of his farm and stock. The opportunity afforded them of bringing before him the latest improvements in building, systems of drainage and cultivation, as well as improved fertilizers should not be overlooked. If our agriculturists desire to retain their sons at home, it is necessary for them to make that home pleasant, and their farms productive and profitable, otherwise youth will be drawn away by the attractions of the city.

GROUP XLI.—Water Supply and Drainage.

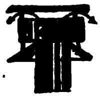


Fig. 80.

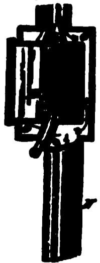


Fig. 81.

Gorman & Magee, 3426 Market street, Philadelphia, showed *Gorman's Patent Automatic Foul Air Valve* for preventing the escape of sewer gases, as arranged for inlets, water-closets, slaughter-houses, outside wells, &c. It is simple in construction, and consists principally of a door balanced horizontally, which falls when any water or other waste liquids fall upon it, allowing them to pass into the sewer, and immediately rises again after their downward passage.

George R. Moore, 622 Arch street, Philadelphia, exhibits his patent *Sanitary Water-closets and Air-closet with Ventilating Flue.* A current of air, or sewer gas, can be kept up in this gas jet ventilator, and maintained at 200° Fahrenheit.

Outside Ventilator.—To keep out the rain, and to secure the aid of the wind in whatever direction it may be moving, to favor an upward draught through the pipe, this form has been adopted. Fig. 81.

Moore's Patent Air-closet for Sick-rooms and Country Homes.—This closet, which the inventor denominates an air-closet, differs from other commodes in its arrangements for securing a perfect ventilation. The main parts of the closet consist of a central trunk, with an automatic screen, and a pipe-flange, through which the air for ventilation passes to a warm flue, which need not be a chimney, but a simple two-inch pipe, heated by a lamp or by gas.

Among the more useful improvements, was the "*Union Filter*," A. H. Peterson, patentee, manufactured by J. H. Cassin & Co., Union Hydraulic Works, Germantown Road and Second streets, Philadelphia, for filtering water under pressure, for use in private residences and manufactories, where clear water is indispensable. It is constructed of cast iron, and is self-cleaning. (See Fig. 82.)

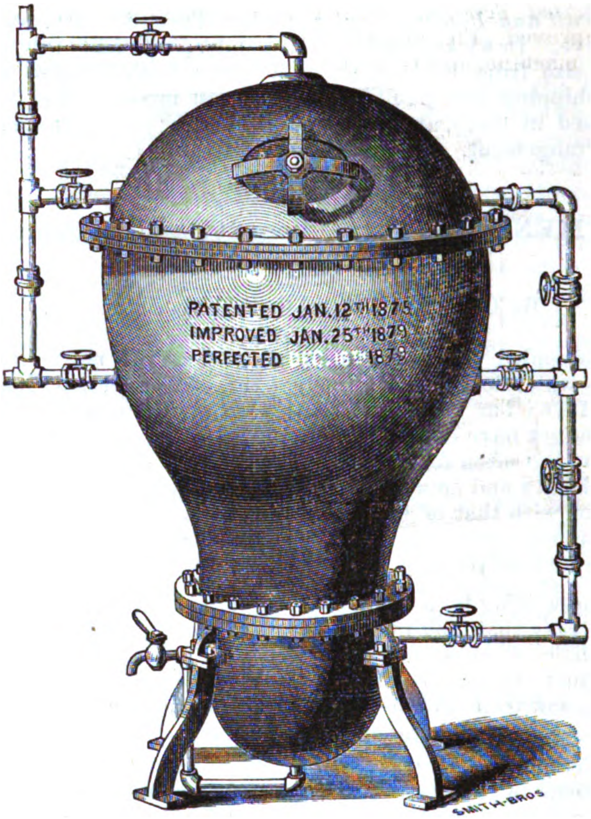


Fig. 82.

The same exhibitor also shows an improved water cooler, in which the ice is placed in a separate receptacle, surrounded by the water to be cooled, which, if desired, may be filtered water.

GROUP XLIV.—EDUCATION AND NATURAL SCIENCE.

This contained a number of very useful improvements, several modes of duplicating letters rapidly being shown.

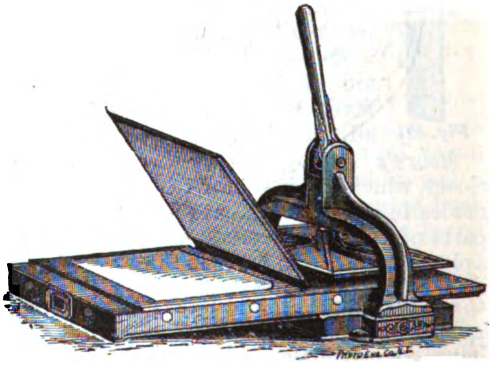


Fig. 83.—Paphyrograph.—Printing-slide as in use in an ordinary Copying Press.

The *Papyrograph and the Gelatine Duplicating Surfaces*, the latter exhibited by W. B. **ZIEBER**, Third and Walnut streets, and by **OSTHEIMER BROTHERS**, Philadelphia, attracted much attention, having been invented since the United States Centennial Exhibition of 1876, and affording rapid means of duplicating letters, circulars, and drawings. Zieber's was a single tray, with lid; Ostheimer's two trays hinged together.

The *Perfected Type-Writer*, exhibited by Messrs. FAIRBANKS & Co., as recently improved, (Fig. 84,) now prints both capital and lower case letters in the same machine, and is to the pen what the sewing machine is to the needle. The writing is done by touching keys, and the manipulation is so simple and easy that any one who can spell can write accurately with it, with very little practice. Letter-press, manifold, and lithographic copies and re-productions can be made, and any kind of paper used to sixteen inches wide, and from one inch long to a continuous roll.

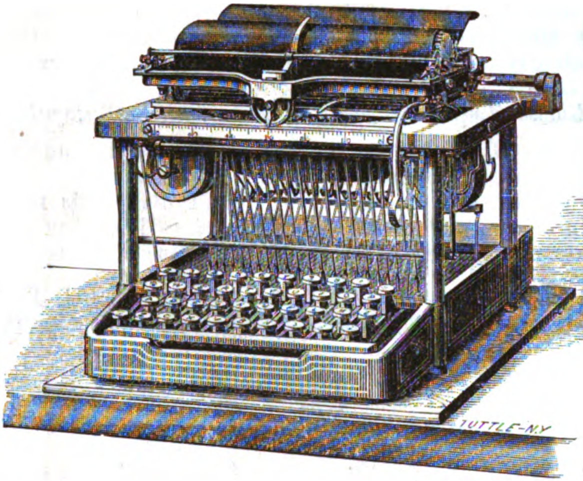


Fig. 84.—No. 2. Perfected Type-Writer.

Fiester's American Standard Job Printing Press, exhibited by REX & BOCKIUS, 614 Filbert street, Philadelphia.

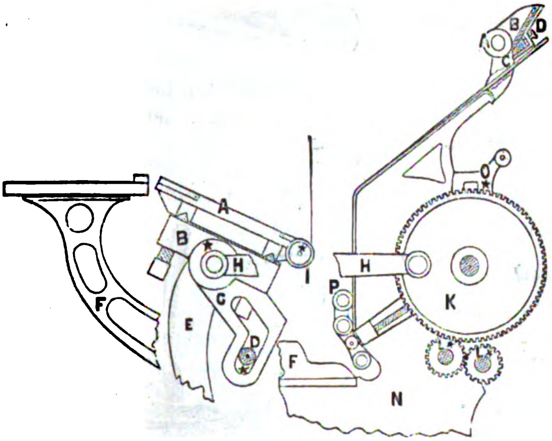


Fig. 29.

Fig. 28.

The diagram, Fig. 28, shows the entire working parts of the American Standard Job Press.

A. Platten.

B. Platten yoke.

C. Curved and slotten platten link, secured to platten yoke *B*, and revolving around stationary roller *D* in feed table bracket *FF*.

E. Section of platten carrier frame, hinged to the main frame of press near the floor, and in which the platten vibrates and revolves in its movements from feed table to form, etc., whilst curved slotted links *C* are revolving around fixed rollers *D* in feed table bracket *FF*.

HH. Shows sections of steel side arms or connecting rods by which the impression is made.

K. Main gear and crank wheel.

LL. Small pinions which drive crank wheels *K*.

N. Main frame of press.

O. Traversing cross operating ink carriage movement.

I. Improved gripper fingure movement by which the gripping fingers are made to travel laterelly, independent of each other, from one side of platten to the other by simply turning the hand wheel marked with the star, no wrench or thumb screw being required in adjusting the grippers.

Figure No. 29, Improved Ink Fountain, with Self Regulator.

A. Supply roller. *B.* Ink knife pivoted to side plates of fountain. *C.* Inclined plane regulator. *D.* Thumb screws for adjustment.

HELLER & BRIGHTLY, 33 North Seventh street, Philadelphia, make a good display of *Engineering Instruments and accessories.* The former embracing several new improvements, insuring rapidity and ease of adjustment. Fig.

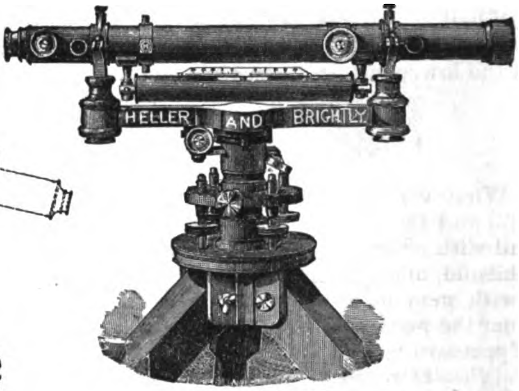


Fig. 23.

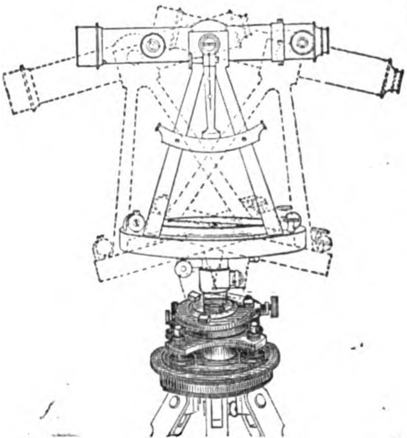


Fig. 25.

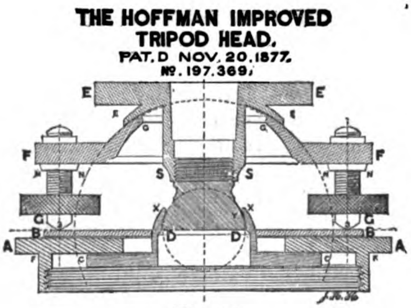


Fig. 26.

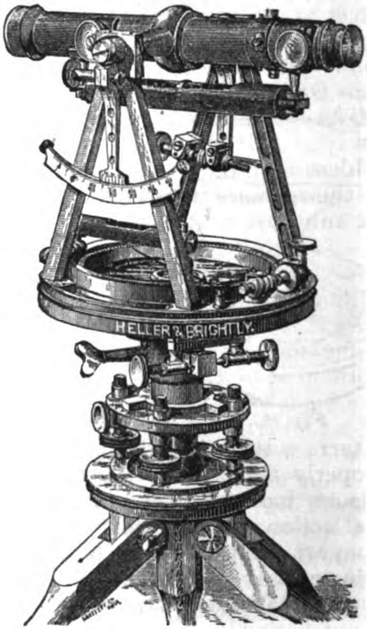


Fig. 24.

23 shows the improved level, and Fig. 24 the transit with the old form of tripod head. Fig. 25 the Hoffman patent improved tripod head, the lower portion (Fig. 26) being a cross-section through the center of the new tripod head. (Fig. 25.)

The plate *AA*—shifting-plate *CC* (to bring the plummet over a point)—the half-ball *DD*—and the leveling screws *GG*, are common to all first-class transits. It will be observed, however, that besides the ordinary half-ball *DD* (moved by the leveling screws *GG*) there is an extra plate *FF*, in which the nuts *nn* (that carry the leveling screws) are placed—the upper part of this plate *FF* is also a half-ball *gg*. This extra plate *FF* always remains horizontal, no matter how much the instrument (attached to the plate *EE*) may require to be turned on its ball *gg* in order to make the levels stand level. On the upper part of the plate *EE*, of which the small half-ball *DD* forms a part, there is a cup or socket *ee* that slides over and on the large half-ball *gg*—these two half-balls *DD* and *gg* are almost two inches apart *and of unequal diameter* (the upper one *gg* having three times the surface of the lower one *DD*,) and are perfect half-balls.

GROUP XLV.—FINE ARTS.

Whatever tends to improve public taste, by lessening the cost of the beautiful and the true in art, benefits the community in many ways. Hence, we hail with great satisfaction the exhibit of Messrs. **Galloway** and **Graff**, of Philadelphia. Their terra-cotta objects of sculpture and statuary, after classic models, are more durable than brown stone, and need no protection from the weather. The light fawn tint is better adapted than the cold white of statuary marble, for lawn and garden ornamentation. Its tones are softer, and they blend more harmoniously with those of the landscape. Cultivated taste long since banished white garden edgings, and as it improves, white as a color for fences, and even for country houses, will give place to less glaring tints. Royality herself recognizes the appropriateness of the delicate color of terra-cotta among foliage, and some of the most stately vases in Kew Gardens, near London, are of that material.

The cuts selected to illustrate a portion of the collection of Messrs. Galloway and Graff, of Philadelphia, on exhibition, are not by any means their boldest designs, but all represent objects adapted to rural decoration, whether on the spacious lawn of the country home, or the less extended grounds of the suburban villa.

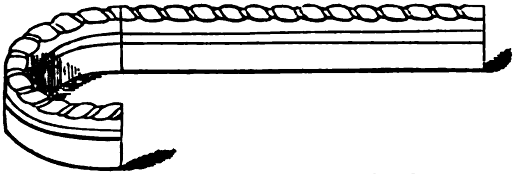


Fig. 125. Garden Edging. 2 feet long.

In Fig No. 27, the vase and pedestal are in separate pieces and may be used separately or together.

Figs. 130, 132, 127, 125, 126, represent different styles and sizes of garden edgings in terra cotta, a material, when properly made and vitrified, almost indestructible under the action of the elements. They are cheaper than the same objects in iron or stone, and much more lasting.

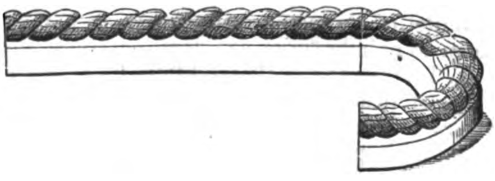


Fig. 126. Garden Edging. 2 feet long.

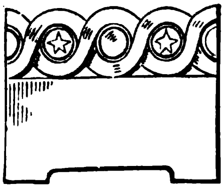


Fig. 130. Garden Edging.
9 inches long.

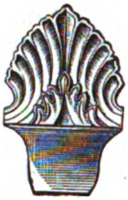


Fig. 132. Garden Edging.
4 inches long.

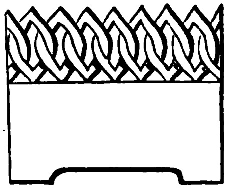


Fig. 132. Garden Edging.
9 inches long.

The original of the Antique Etruscan Vase, Fig. 61, is now in the British Museum.

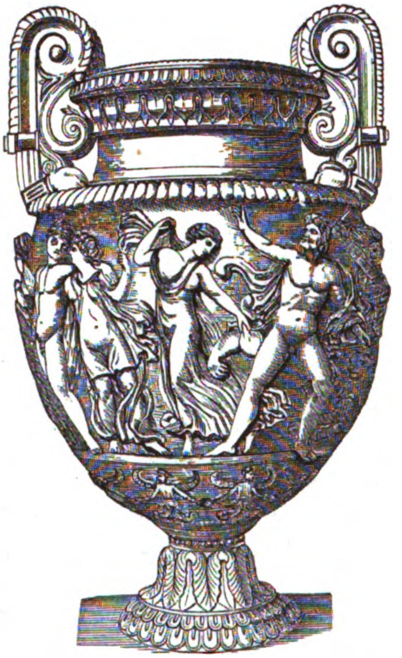


Fig. 61. Vase from British Museum.
35 inches high.

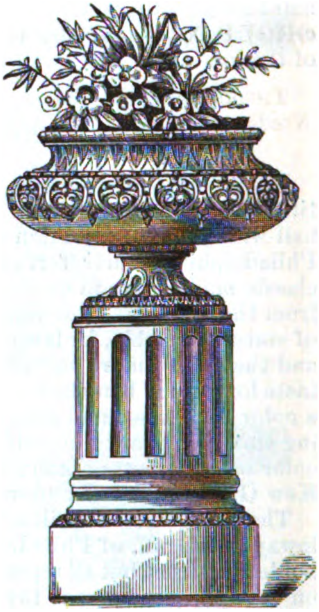


Fig. 27. Vase. Width, 18 inches.
Pedestal. Height, 18½ inches.

The center piece of the superb display of wax work, by Mrs. THOMAS WEAVER, Philadelphia, is a sloop composed entirely of wax flowers, which floats upon a sea of flowers. Its hull is delicately tinted, the cordage of forget-me-nots, and the sails of verbenas. The mainmast carries a flag, with the name of the little craft, "Mischief." A cross of flowers, a small wreath of delicately tinted buds, a lyre of blue velvet, over which twine vines and white flowers, a collection of boutonaires, and a magnificent bouquet of choice flowers, so true to nature that as we approach we expect them to exhale fragrant odors, complete this artistic collection.

T. LEONHARDT & SON exhibited a frame containing very creditable specimens of lithographic work, and SCHREIBER & SONS, Philadelphia, exhibited a very fine series of photographs of animals from plain and re-touched negatives, both plain and colored, as well as some life size enlargements of heads of cattle, one of which was finished up in crayon by Miss Pauline Imlay, Philadelphia.

The **LEVYTYPE COMPANY**, Seventh and Chestnut streets, Philadelphia, exhibits samples of *Relief Printing.* The plates, having been made by the levytype process, resemble wood engraving. They are obtained by photography. A photograph is taken upon a prepared plate, which is afterwards so treated that the parts between the *lines* of the picture, and which were not acted upon by light, become raised. A plaster cast is taken from this, in which the lines of the picture are raised, as in a wood-cut. A plaster cast is now taken from the former, which furnishes the matrix for a stereotype plate ready for the printing press, upon being trimmed and blocked. The stereotype plates made by this process may be duplicated in the usual way by stereotyping, or by electrotyping.

By this process, drawings, wood-cuts, lithographs, copper and steel plate engravings may be enlarged or reduced at a slight cost. The beautiful cut of the ice pitcher, in Group XXVI, was made by the levytype process.

GROUP XLVI.—MUSICAL INSTRUMENTS AND IMPLEMENTS FOR OUT-DOOR SPORTS.

THEODORE J. HARBACH, 809 Filbert street, Philadelphia, exhibited the *Needham Musical Cabinet.* (Fig. 32.) A reed instrument operated by pedals which both move a roll of peforated paper and blow the bellows, of which there are two. A roll of perforated paper passess between the

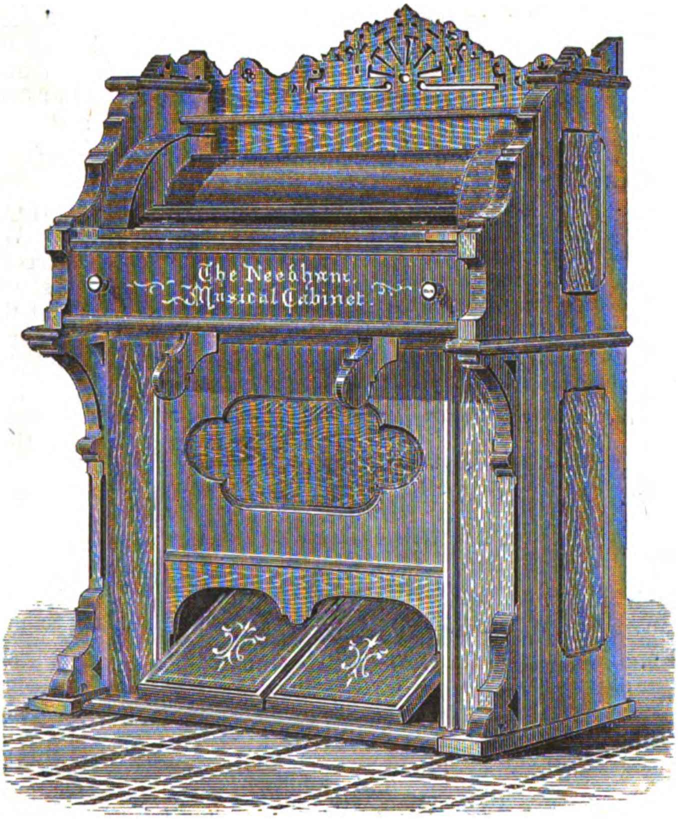
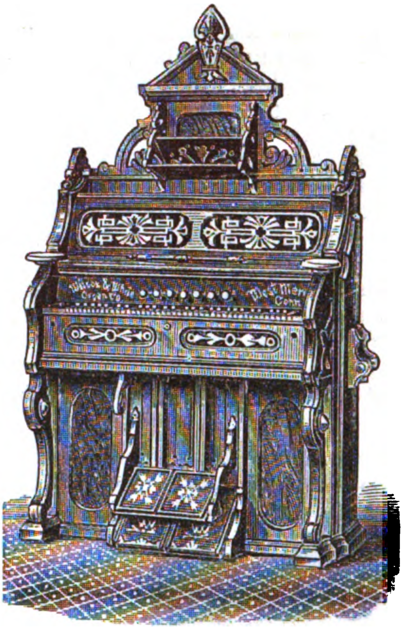


Fig. 32.

reeds and wind-chest, the time being varied by the pedals, and the tone by the use of either the soft or loud bellows which may be brought into action as desired. The musical cabinetto is a reed instrument of smaller size, on the same principle, but operated by different means.

Both the musical cabinet and the mechanical orguinette play any air for which the perforations in the paper may have been arranged, and thus hundreds of airs may be played by a simple mechanical movement.

F. A. NORTH & Co., 308 Chestnut street, Philadelphia, exhibited the *Wilcox & White Improved Parlor and Cabinet. Organs.* The superiority claimed for and apparent in these instruments was in their rich pipe like quality of tone, the promptness of action and utterance and thoroughness of construction. Their patent children's pedals enable a child of five years of age to blow easily and leave the arms and hands at the proper elevation for playing.


Wilcox & White Organ Co.
West Meriden Conn.

Wilcox & White Improved Parlor Organ with, Patent Children's Blow Pedals attached.

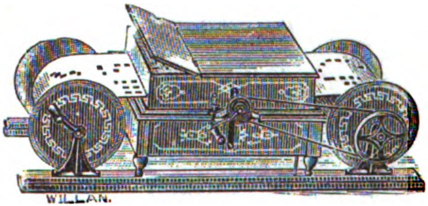


Fig. —. Orguinette. Style C, with attachment.

The *Mechanical Orguinette* was exhibited by Professor WILLIAM BLASIUS, 1413 Chestnut street, Philadelphia. In the smaller sizes, (Fig. —, by turning the crank at the side, the roll of perforated paper passes between the wind chest and the reeds at the same time that it operates the bellows. The paper acts as a valve, closing the apertures of the reeds until a perforation passes over them, and permits the air to issue, producing the note. The time varies with the speed of the crank, and the expression is varied by opening and closing the lid. In the larger size, denominated the cabinet orguinette, the reeds are opened and closed by fingers, which fall into the apertures of the paper while it is being moved by the crank, (by hand,) while the bellows are operated by the feet, producing music in any time and tone desired, whether by a novice or an accomplished performer.

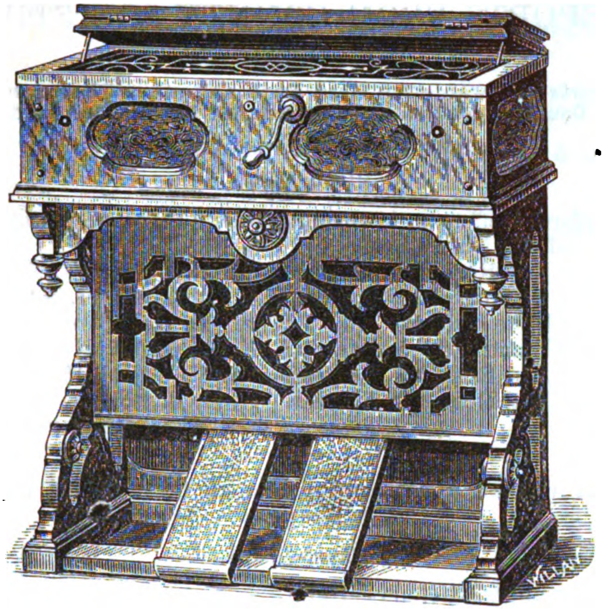


Fig. —. Cabinet Orguinette.

GEORGE W. BOYD, of Harrisburg, exhibited some *Split Bamboo Salmon and Trout Rods*, in which the tips were of split bamboo glued up with the enameled side outside, in place of being reversed, as done by many other makers.

H. W. BULTZ's collection of *Velocipedes* and other incentives to out-door exercise, well adapted to their purposes, was deservedly admired by young and old.

GROUP XLIX.—UNCLASSIFIED.

EDIS MOCKRIDGE & Co., 18 North Fourth street, Philadelphia, exhibit a new application of *Celluloid*, which is a combination of cellulose or the woody fiber of cotton and gum camphor united under heavy pressure. The articles shown are water-proof—collars, cuffs, and bosoms for ladies and gentlemen—manufactured by the Celluloid Water-Proof Cuff and Collar Company, of New York. The peculiarity of their articles is that they look like fine glossy linen, yet can be worn for many days without becoming perceptibly soiled, and even then can be restored to their original whiteness and luster by the simple application of a wet cloth or they can be washed with hot water and soap, yet retain their stiffness. May be worn from three to six months, and in many cases a whole year before being worn out, especially if worn with the new patent cuff and collar buttons which do not fray the button holes.

REPORTS FROM COUNTY SOCIETIES.

Official Reports of Awards for Herd Book and other Thoroughbred Cattle, made by County Societies at their Annual Exhibitions held in 1879.

BUTLER DRIVING PARK ASSOCIATION.

Short-Horns.

S. W. Crawford, Jefferson township. Bull "Duke of Butler," 2 years. A. H. B., vol. 17, No. 29,134.
Same. Cow "Red Rose, 5th," 3 years. A. H. B., vol. 16, No. 12312.
Same. Heifer "Emma, 4th," 2 years. A. H. B., vol. 17, No. 12872.
Same. Bull "Duke of Butler, 2d," 1 year. A. H. B., vol. 18, No. 32223.
Same. Cow "Emma, 3d," 5 years. A. H. B., vol. 15, No. 533.
Same. Cow "Red Rose, 4th," 4 years. A. H. B., vol. 15, No. 864.
Same. Cow "Red Rose, 6th," 1 year. A. H. B., vol. 18, No. 13893.

W. P. ROESSING, *Secretary.*

CHARTIERS VALLEY AGRICULTURAL SOCIETY, CANONSBURG, WASHINGTON COUNTY.

Short-Horns.

McClelland Brothers, Hickory—Herd.
Same. "Baron Duke," over 3 years. A. S. H., No. 22021.
Same. Cow "Mary," 2 years. A. S. H., vol. 17, No. 23201.
Same. Cow "Minnette, 3d," 2 years. Sire "Duke of Thorne." Vol. 14, No. 22952.
Same. Cow "Emma, 4th," over 3 years. A. S. H., No. 23201.
Julius Lemoyne, Washington, bull "Col. Hazzard," under 1 year. Sire "Duke of Thorne," No. 22952.
Same. Bull "Duke of Thorne," over 3 years. A. S. H., No. 22952.
Same. Cow "Playmate," over 3 years. Vol. 14, A. S. H.
Same. Cow "Red Lily, 2d," 1 year. A. S. H., vol. 14.
Same. Heifer "Lady Baroness, 2d," under 1 year. Sire "Duke of Thorne."
W. R. Craighead & Son, Canonsburg. Bull "Pioneer," 1 year. A. S. H., No. 33463.
Same. Heifer "Princess Anne," under 1 year. A. S. H., No. 24708.
Aaron Galbraith, Canonsburg, bull "Red Cloud," 6 months. A. S. H., 27781.

Devons.

John M. Miller, Hickory—Herd. Bull "Barrister," over 3 years. A. D. H. B., No. 734.
Same. Cow "Belle Patterson," over 3 years. A. D. H. B., vol. 5, No. 1422.
Same. Cow "Belle Flora, 7th," over 3 years. A. D. H. B., No. 1410.
Same. Cow "Luna, 1st," 2 years. A. D. H. B., No. 2491.
Same. Cow "Rena, 14th," 2 years. A. D. H. B., No. 2595.
Same. Heifer "Luna," 1 year. A. D. H. B., sire No. 734, dam No. 2596.
Same. Heifer "Luna, 2d." A. D. H. B., sire No. 734, dam 1422.

Holsteins.

Buchanan, Henderson & Co., Washington. Bull "Geneva Duke," over 3 years. H. H. B., vol. 3, No. 254.
Same. Cow "Afra," over 3 years. H. H. B., No. 70.

Jerseys.

John Gregg & Sons, Shirland—Herd.

F. N. POTTS, *Secretary.*

COLUMBIA COUNTY AGRICULTURAL SOCIETY.

Jerseys.

A. P. Young, Millville. Bull "Bucephalus, 2d," 2 years. A. J. C. C., No. 3,198.
Same. Cow "Sterna," 2 years. A. J. C. C., No. 6322.
George A. Herring, Bloomsburg. Bull "Prince of Bloomsburg," 1 year. A. J. C. C. No. 3411.

M. W. NUSS, *Secretary.*

CRAWFORD COUNTY CENTRAL AGRICULTURAL SOCIETY, (MEADVILLE.)

Short-Horns.

J. B. Cochran, Meadville, bull "Duke of Mahoning," 3 years. A. H. B., vol. 17.
Same. Heifer "Maroon, 2d," 2 years. A. H. B., vol. 17.
Same. Cow "Countess, 4th," 6 years. A. H. B., vol. 17.
Same. Heifer "Lady Bonton, 1st," 6 months. A. H. B., vol. 18.

Holsteins.

Edgar Huidekoper, Meadville, bull "Anton," 2 years. H. H. B., vol. 4, No. 462.
Same. Bull "Warren," 1 year. H. H. B., vol. 4, No. 463.
Same. Bull "Wouter," 1 year. H. H. B., vol. 4, No. 460.
Same. Bull "Darius," under 1 year. H. H. B., vol. 4, No. 457.
Same. Bull "Irvine," under 1 year. H. H. B., vol. 4, No. 456.
Same. Heifer "Edna," 2 years. H. H. B., vol. 4, No. 738.
Same. Heifer "Litje," 2 years. H. H. B., vol. 4, No. 747.
Same. Heifer "Aletta Twisk," 1 year. H. H. B., vol. 4, No. 742.
Same. Heifer "Janke," under 1 year. H. H. B., vol. 4, No. 749.
Same. Heifer "Haidee," under 1 year. H. H. B., vol. 4, No. 754.

Jerseys.

C. C. Carroll, Meadville, bull "Young Baltimore Boy," 4 years. A. J. C. C., vol. 4, No. 2048.
Same. Heifer "Crawford Belle," 2 years. A. J. C. C.
Same. Cow "Glenmore Belle," 4 years. A. J. C. C., vol. 4, No. 4801.
Same. Heifer "Trinket," 5 months. Not yet registered.
Same. Cow "Embla," 4 years. A. J. C. C., No. 4799.

A. C. MCMICHAEL, *Secretary.*

ERIE COUNTY AGRICULTURAL SOCIETY.

Herds.

J. C. Thornton, Fairview. Best herd Short-Horns.
E. C. Bliss, Westfield, New York. Best herd Devons.

Short-Horns.

J. C. Thornton, Fairview. Bull "9th Duke Trout Run, 9th," 1 year.
Same. Bull "Louan Duke," 2 years.
Same. Bull "Duke of Loudon, 6 years.
Same. Bull calf "Duke of Trout Run, 10th."

Same. Cow " Bell," 6 years.

Same. Heifer " Sady, 2d," 16 months.

Same. Heifer " Frolic, 3d," 16 months.

Same. Heifer " Fancy," 11 months.

Devons.

E. C. Bliss, Westfield, New York, bull " Buckeye, 2d, 3 years A. D. H. B., No. 768.

Same. Bull " Lovely's Puritan, 2d," 2¼ years. A. D. H. B., No. 1268.

Same. Bull " Hamlet," 1 year. A. D. H. B., No. 1229.

Same. Bull " Cæsar," 2 months.

Same. Cow " Lovely, 18th, 17 years.

Same. Cow " Jenny," 6 years. A. D. H. B., No. 1771.

Same. Cow " Beauty," 4 years. A. D. H. B., No. 1383.

Same. Heifer " Satie," 1 year. A. D. H. B., No. 2633.

Same. Heifer " Jessica," 11 months. A. D. H. B., No. 2402.

Same. Heifer " Viola," 11 months. A. D. H. B., No. 2665.

Ayrshires.

William Fairweather, McLane, Pennsylvania, bull " Sitting Bull," 3 years, R. A. R., Vol. 2, No. 153.

Same. Bull " Laird o'Cock Pen, 1 year. A. R., vol., No., 2135.

Same. Bull " Plato," 3 months. vol. 2.

Same. Cow " Riverside Bell," 4 years. A. R., No. 3754.

Same. Cow " Lulie Fearnot," 3 years. A. R., No. 4347.

Same. Cow " Floss," 3 years. A. R., No. 2093.

Same. Cow " Mollie Pender," 2 years. A. R. No. 4351.

Same. Cow " Bessie Belle, 3d," 2 years. A. R.

Same. Heifer " Rosie Lorain," 1 year. A. R., vol. 3, 4418.

Holsteins.

W. W. Reed, Erie. H. H. B.

Same. Bull, " Pioneer," 16 months, No. 319.

Same. Heifer, " Minnie," 14 months. H. H. B., No. 479.

GEORGE BURTON, *Secretary.*

FARMERS' AGRICULTURAL SOCIETY, WELLSBORO', TIOGA COUNTY.

Holsteins.

H. W. Stewart, Delmar, bull, 1 year,	$2

Jerseys.

Ira D. Hotchkiss, Delmar, bull, 2 years,	$3
F. K. Wright, Wellsboro', bull " James Basard," 3 months,	2
Thomas Allen, Delmar, bull " Jacob R.," 3 months,	1

Ayrshires.

Daniel Field, Delmar, bull, 4 years,	$4

Hereford.

Eberenz & Bailey, Delmar, bull " Duke," 5 years,	$4

J. W. MATHER, *Secretary.*

HARFORD AGRICULTURAL SOCIETY, SUSQUEHANNA COUNTY.

Short-Horns.

C. A. Summers, New Milford, bull "Gloster of Montrose," 4 years. Sire "Gloster of Pine Grove," dam "Sunbeam, 3d."

Same. Bull "Harry Gloster," 1 year. Sire "Gloster of Montrose," dam "Princess."

Same. Heifer "Maud," 2 years. Sire "Gloster of Montrose," dam "3d Duchess of Silver Lake."

Devons.

D. & J. Banker, Franklin Forks, bull "Prince of Wales, 19th," 1 year. A. D. H. B.

Same. Heifer "Rose of Baltimore, 7th," 1 year. A. D. H. B.

Same. Heifer "Belle, 8th," 3 years. A. D. H. B.

Same. Cow "Edith, 5th," 7 years. A. D. H. B.

LEE TIFFANY, *Secretary.*

INDIANA COUNTY AGRICULTURAL SOCIETY.

Short-Horn.

A. W. Ewing, West Lebanon, bull, 2 years, $15.

Ayrshires.

T. C. Loughry, White township, bull, 2 years.

Same. Ayrshire B., sire Lancet, No. 1776, dam Daisy, 2nd.

G. E. SMITH, *Secretary.*

LAWRENCE COUNTY AGRICULTURAL SOCIETY.

Short-Horns.

N. B. Carter, Eastbrook, bull "King of Lawrence," 4 years. A. S. H., vol. 11, No. 12612.

Same. Cow "Lady Gray," 4 years. A. S. H., vol. 11, p. 769.

James Simonton, Neshannock Falls, bull "Prince Albert," 2 years. A. S. H., vol. 19.

George Greer, New Castle, bull "Reformer." A. S. H., vol. 19.

William McCreary, New Castle, bull "Duke of Greenville, Jr."

Samuel McCreary, Neshannock Falls, bull "Fancy Boy," under 1 year. A. S. H., vol. 11, p. 730.

Same. Heifer "Jenny Lind, 5th," 1 year. A. S. H., vol. 11, p. 726.

Same. Cow "Jenny Lind, 4th," 2 years. A. S. H., vol. 11, p. 726.

Short-Horns.

C. H. Andrews, Youngstown, Ohio, bull "Grand Duke of Oak Hill," 1 year. A. S. H., vol. 18, No. 32764.

Same. Bull "9th Bates of Oak Hill," under 1 year; sire "5th Duke of Vinewood," 32443; dam "Louan of Vinewood."

Same. Heifer "Lady Fair, 6th," under 1 year; sire "5th Duke Vinewood;" dam "Lady Fair, 5th." A. S. H., vol. 16, No. 12145.

Same. Cow "Rose," 4 years and over. A. S. H., vol. 13, p. 909.

Same. Cow "5th Duchess of Vinewood," 3 years. Ohio, S. H. Record, vol. 1, p. 182.

Same. Heifer "Duchess of Oak Hill," 1 year. A. S. H., vol. 18, p. 13645.

J. R. Martin, Plaingrove, Pennsylvania, bull "Red Jacket." A. S. H., vol. 17.

Jerseys.

Green & Henderson, Hill post-office, bull "Lackawannock." A. J. C. C., vol. 7, No. 1859.

M. B. McKinley, Mercer, bull "William Curtis," 3 years. A. J. C. C., vol. 6, No. 1358.

A. Lewis, New Castle, bull "Dom Pedro," under 1 year; sire "Earl of Willow Glen," No. 2043; dam "Nora," No. 850.

W. L. Butz, *Secretary.*

Lehigh County Agricultural Society.

Short-Horns.

F. J. Schreiber, Allentown, bull "Chief of Little Lehigh," 6 years. A. S. H., vol. 13, No. 16466.

Same. Cow "Red Lady," 7 years. A. S. H., No. 13, p. 722.

Devons.

O. L. Schreiber, Coplay, bull "Lackawanna," 1 year. Am. Dev., vol. 5, No. 1255.

Same. Cow "Pallas," 6 years. Am. Dev., vol. 4, No. 1968.

Same. Heifer "Phœbe," 15 months. Am. Dev., vol. 5, No. 2562.

Swiss.

Henry Leh, Allentown, bull "Chetwood," 3 years. Swiss Herd Book, vol. 1, No. 56.

Same. Cow "Lemon," 3 years. Swiss Herd Book, vol. 1, No. 53.

Jerseys.

Beuben Glick, South Whitehall, bull "Scion," 6 years. A. J. C. C., vol. 3, No. 1033.

Andrew S. Keck, Allentown, cow "Deception," 7 years. A. J. C. C., No. 6734.

Same. Heifer "Pearly," 19 months. A. J. C. C., No. 7644.

L. P. Hecker, *Secretary.*

Montour County Agricultural Society.

Short-Horns.

Joseph H. Morgan, Liberty township, bull, 1 year,	$2
Caleb Appleman, Valley township, heifer, 2 years,	2
N. E. Sidler, Valley township, cow, 4 years,	2

Devons.

Roger Hendricks, Valley township, bull 21, months,	$2
William Sechler, Mahoning township, cow, 4 years,	2

Jerseys.

D. Winterstine, Valley township, bull, 1 year,	$2
R. H. Wooley, Danville, cow, 2 years,	2

J. Leveisfort, *Secretary.*

MONTGOMERY COUNTY AGRICULTURAL SOCIETY, (AMBLER PARK.)

Short-Horns.

Lukens & Bisson, Doylestown, bull "Victor," over 2 years.
Charles Allen, Doylestown, bull "Duchess, 1st," 3 months.
Same. Cow "Vick," 3 years.
Same. Cow, "Star," over five years.
James Gillen, Upper Dublin, bull, three years.
Same. Bull, under 1 year.
Same. Cow, 4 years.

Jerseys.

Miss Josephine Marlin, Broadaxe, bull "Bonnivard," 4 years.
Thomas A. Biddle, Penlynn, bull "Dextor," 3 years.
Same. Heifer "Cowslip," 1 year.
Same. Cow "Lady Gray," 4 years.
James Mooney, Plymouth Meeting, bull "Scipio," 4 years.
Same. Bull "Leamington," under 1 year.
Same. Cow "Bell de Gates," 5 years.
Same. Cow "Magdalen," 4 years.
Same. Heifer "Lady Montgomery," 1 year.
Charles Stetston, Lansdale, heifer, under one year.
William Armstrong, Montgomery Square, bull "Knight of Glencove," 1 year.
Same. Cow "Honesty," over 5 years.
Same. Heifer "Maiden," under 1 year.

Guernseys.

James Mooney, Plymouth meeting, bull, "Longfellow," 1 year.
Same. Cow "Lady Jane," under 5 years.
Same. Heifer "Lady Mooney," under 1 year.
Same. Heifer "Lady St. Clair," under 1 year.
S. W. Comly, Ambler Park, cow "White Rose," 7 years.
Same. Cow "Lilly," 3 years.
Same. Cow, 5 years.

Holsteins.

William M. Singerly, Gwynedd—Herd.
Same. Bull "Oneida Chief," 3 years.
Same. Cow "Antjeal," 1 year.
Same. Cow "Tiney."
George Handy Smith, Gwynedd, heifer "Norah," under 1 year.

JOSEPH REX, *Secretary.*

OXFORD AGRICULTURAL SOCIETY, OXFORD, CHESTER COUNTY.

Short-Horns.

L. H. Long, Maysville, Kentucky—Herd.
Same. Bull "Duke of Mason," 3 years.
Same. Bull "Duke of Mason, 2d," under 1 year.
Same. Bull "Minnesota, 3d," under 1 year.
Same. Bull "Mason Ardney," 18 months.
Same. Cow "Minnesota, 3d," 3 years.
B. L. Wood, Doe Run, bull, 16 months.
W. J. Preston, Maryland, bull, 4 years.

Guernseys.

R. H. Hodson, New London, bull, 8 years,	$10
Same. Bull, 3 years,	10

Jerseys.

Joseph T. Barnard, cow, 3 years,	$10

THEODORE K. STUBBS, *Secretary.*

UNION AGRICULTURAL SOCIETY, BURGETTSTOWN, WASHINGTON COUNTY.

Short-Horns.

Fulton & Hamlin, Hamlin Station, bull "Hanover Hero," 16 months. Allen, vol. No 32797.

Same. Bull "Hanover Hero, 2d," 5 months. Allen, sire Count Bismarck, 19271, dam Mary Anne, 25, vol. 15.

Same. Bull "Count Bismarck," 5 years. Allen, vol. 14, No. 19271.

Same. Bull "1st Duke of Hanover," 2 years. Allen, vol. 17.

JOHN P. WOODS, *Secretary.*

WESTMORELAND AGRICULTURAL SOCIETY.

Short-Horns.

F. Y. Clopper, Greensburg, bull "2d Duke of Skara Glen." 1 year. A. S. H., vol. No. 19.

Same. Bull "3d Duke of Skara Glen," 11 months. A. S. H., vol. 19.

Same. Heifer "Maid of Skara Glen, 6th." A. S. H., vol. 19.

Same. Bull "4th Duke of Skara Glen," 9 months. A. S. H., vol 19.

Same. Cow "Pride of Skara Glen, 2d," 4 years. A. S. H., vol. 15, p. 829.

Same. Heifer "Maid of Skara Glen, 4th," 2 years. A. S. H., vol. 17, No. 13030.

Same. Cow "Maid of Skara Glen, 2d," 4 years. A. S. H., vol. 15, p. 733.

William Steel, Greensburg, bull "Prince Van Meter," 5 years. A. S. H., vol. 14, No. 20713.

Thomas Donahoe, Greensburg, bull "Duke 7th of Wheatland," 1 year. A. S. H., vol. 18, No. 32457.

Same. Heifer "2d Grace Wheatland," 2 years. A. S. H., vol. 17, No. 12914.

Sweepstake Prize for Best Cow or Heifer any Age and Breed.

Thomas Donohoe, Greensburg, "2d Grace Wheatland," 2 years.

Same. "Lady Wheatland." A. S. H., vol. 18, No. 13765.

Jerseys.

W. H. Harke, Greensburg, cow "Mary of Westmoreland," 3 years.

HENRY KETTERING, *Secretary.*

WEST PENNSYLVANIA AGRICULTURAL SOCIETY, MERCER.

Short-Horns.

W. C. Wilson, Neshannock Falls, bull, 4 years,	$8
Same. Cow, 4 years,	5
Same. Cow, 3 years,	3
Same. Heifer, 6 months,	2

S. McCreary, Neshannock Falls, cow, 3 years,	5
Same. Heifer, 1 year,	4
Same. Bull, 6 months,	2
Wood & Ferguson, Mercer, bull, 3 years,	4
Jesse Hoagland, Hermitage, bull, 2 years,	4
John Armstrong, Mercer, bull 2 years,	4
James Simington, Neshannock, Falls, bull, 6 months,	1
R. S. Madge, Worth, Cow, 4 years,	7
David Gilson, London, bull, 4 years,	5
Same. Heifer, 1 year,	2
Moore Magoflin, Mercer, Heifer, 6 months,	1
W. A. & T. A. McCoy, Mercer, bull, 3 years,	6
Same. Heifer, 2 years,	4
Same. Heifer, 2 years,	3

Devons.

M. B. McKinley, Mercer, bull, 1 year,	$2
Same. Bull, 6 months,	1
Same. Heifer, 1 year,	2
Same. Heifer, 6 months.	1

Jerseys.

William L. Fox, Foxburg, heifer, 6 months,	$4
Same. Cow, 4 years,	7
Same. Bull, 4 years,	5
M. B. McKinley, Mercer, heifer, 1 year,	2
Same. Cow, 3 years,	5
Same. Bull, 3 years,	6
Same. Bull, 4 years,	8
Geen & Henderson, Mercer, heifer, 6 months,	1
Same. Heifer, 1 year,	4
Same. Heifer, 2 years,	4
Same. Cow, 3 years,	3
Same. Bull, 6 months,	2
Same. Bull, 1 year,	4
Byers Brothers, Mercer, cow, 4 years,	5
Same. Bull, 2 years,	2

W. J. McKean, *Secretary.*

YORK COUNTY AGRICULTURAL SOCIETY.

Short-Horns.

G. Edward Hersh, York, bull "Snow Flake," 3 years and over. A. H. B., vol. 16, No. 27927.

Jerseys.

Michael Schall, York, bull "Pimlico." A. J. C. C., No. 3379.

Jacob D. Heiges, York, heifer "Pride of Glendale," 11 months. A. J. C. C., No. 9044.

A Heistand Glatz, *Secretary.*

PRIZE ESSAY.

No. 1.—On the Causes of the Failure of Crops, and in Farming.

By H. E. STOCKBRIDGE, *Amherst*, *Massachusetts*.

On one of the green hillsides everywhere enhancing the picturesque beauty of rural New England, are three homesteads long since deserted, and the houses, once sheltering the families of thrifty farmers, are crumbling with a slow decay. In the old stage road which passed the doors, trees more than a score of years old are growing, and cattle browse; "where once a garden smiled, and where still many garden flowers grow wild." From the door-stone of either farm-house, a scene of surpassing beauty is unveiled. In the back-ground rise, tier above tier, the wooded, cloud capped hills of the Green mountain range, while in the fore-ground the ancient highway descends between lichen-covered walls to the valley through which leaps and flows the stream whose want it was to drive the upright-saw, which in yonder neglected mill played so important a part in clearing the surrounding hills of their forest covering. On either side, surrounded by gray moss grown walls, are fields which were once tilled farms.

Long years have elapsed since the last furrow was turned in these bowlder checked enclosures, and the wilderness has reclaimed its own, or perhaps a few young cattle graze, where not prevented by the usurping second growth timber. Here and there a woful, uncared for seedling apple tree stands, witness of the civilization that has vanished.

Far away on the distant horizon can be faintly traced the glistening waters of the Connecticut, as they majestically wind through the garden of New England, until with a final curve they disapear behind the encircling hills.

The scene I have thus hastily sketched, is no imaginary one; but exists, with a varied setting, in all the older States in the Union, and like pictures are fast forming in the boundless West, having their reflections in the agricultural journals of the land. Were this not true, the press would not contain such ejaculations as: "Does farming pay?" "Agricultural failures," "Depopulation of the country," "How shall we keep our boys on the farm?" and kindred disheartening sentiments.

These expressions must have foundation in fact, even agriculture must have its dark side; all cannot be success. Failures must inevitably occur; and yet I am fain to believe that farmers, as a class, are prone to look at the gloomy side of life, and are more given to the rehearsal of their failures than of their successes.

Nevertheless it is only too true, that profitable agriculture is becoming more and more difficult; that many once fertile farms are now deserted, and that few yield in their prestine abundance. Does this lamentable state of affairs result from some baneful infection? Has a devouring pestilence swept over our American farms, and contaminated the farmers? Or do we simply witness a natural event, the coming of which might have been foretold, and its occurrence prevented, or its evil influences guarded against? The latter supposition is certainly correct. Let the cause then be sought, and a remedy applied, if not even now too late.

The soil is the fountain from which all prosperity flows, and success in agriculture depends on the yield of its products. Failures in farming can only occur through failures with crops; so long as the soil yields abundance in return for the care of the husbandman, he must prosper, unless there is something lacking in the man, for which we are not accountable; and successive failures with crops, must produce failure in farming. This is the stage at which the depopulated farms of the country have arrived.

If, therefore, we can account for the non-success of crops, we have solved the problem involving American failures in farming.

I believe that a glimpse at the history of our agriculture, showing the methods pursued, and their effect on the products of cultivation, will afford us the key to the mystery.

When the first settlers entered the American wilderness, and sought in the new world the freedom denied them in the old, hill and vale were alike covered with "the forest primeval;" when the axe had brought into existence a clearing farm, an oasis of civilization in the midst of nature and barbarism, the virgin soil, unexhausted by man's improvidence, lay before the industrious pioneer waiting to receive the seed, and capable of yielding an hundred fold.

Timber was of little value, and the trees were wholly, or in part, burned on the ground which had borne them. And here was the first step in the constant depletion we are compelled to trace; for the almost invariable initiatory proceeding toward fitting the soil for cultivation, has been to burn it over. And though this process left the land covered with a coating of ashes, rich in all the mineral elements of plant nutrition, the vast stores of organic food which had for ages accumulated in the vegetable mold, was totally destroyed. Notwithstanding this shameful wastefulness, the soil was comparatively fertile, and bore, for years, crops that would to-day seem marvelous.

But the short-sighted cultivator rarely returned an equivalent for the product removed. Nature could not for ever stand the drain upon her resources, and so, after a few generations of children had gone to sustain the ever-waning vitality of the town, and a few generations of stock had been sent to feed them and their non-producing neighbors, returning naught to the nurturing farm, its life passes into that of its offspring, and its last owner goes in search of fresh fields and pastures green, or follows his predecessors to the town, a prey upon homesteads fast approaching the same end. This is, in brief, the history of a pernicious system of cultivation, which, beginning with the Atlantic sea-board, has followed the "star of empire" westward, leaving evidence of its baneful effects on most of our eastern farms, and still engaged in producing the same results on the prairies beyond the Mississippi.

American agriculture has been one vast system of pillage and plunder. Land is abundant, and, through false ideas of economy, our farmers have considered it better to procure new, untilled soil, rather than maintain the fertility of the farms on which many of them grew to manhood. This is the first cause for the failure of crops, and its consequences. Plants, like animals, must receive nourishment, and when deprived of it they die; and when, for any reason, the soil contains no more nutriment it fails to support crops.

It is not our purpose to propose remedies for the evils of this system or for other influences resulting in the failure of crops; but if we can ascertain the true causes, reformation will regulate itself, for whenever the cause of a difficulty is apparent, its removal is sure to follow, and our subject pre-supposes a difficulty in the way of successful agriculture.

Now, I have shown the first reason for a failure of crops to be insufficient attention toward supplying the food necessary for a profitable return; but what is the underlying cause of this neglect? It cannot be simply because land is abundant and cheap, that Americans lack home attachments, or because they possess a roving nature, and prefer to leave the refinements and advantages of eastern life for new scenes in the unsettled West: neither have they neglected the fertility of their wooded farms for the superior productiveness of prairie homesteads, for both were found by man in the same fertile condition, and only by his improvidence has one been reduced lower than the other.

And certainly all men recognize the superiority of a productive East over a productive West; advantages, both social and economical, because of wealth and longer established civilization, and because of the saving in transportation, through the contiguousness of producer and consumer.

Where, then, are we to look for the prime instigator of this rebellion against nature? Why have our farmers failed to maintain the fertility of their soil, and its resulting productive power? I believe the fault lies in their ignorance of the *technique* of the art in which they are engaged. Not that American farmers are wanting in intelligence, for their equals, in this respect, the world does not contain, and in average education they far surpass the cultivators of any other country; but it is only too true that this education has not been directed toward supplying the needs of their profession, has not been applied to the advancement of their calling.

The owners of our soil have been wofully negligent of the natural laws governing the growth of plants, and hence the production of crops. They have been utterly regardless of the principles on which the success of their art depends; that unless the elements of fertility, removed from the soil by the plant, are in some available form returned, deterioration and subsequent failure must ensue.

Now there has been no lack of information on this subject, the present condition of affairs was foretold long ago; but farmers are proverbially a conservative class, clinging steadfastly to the traditions of their fathers; though when an improvement in tangible form presents itself, one whose advantages are apparent, and the benefits from the use of which are brought directly to notice, our farmer, believing the evidence of his own eyes, eagerly accepts the new aid and wonders at his former lack. As a consequence of this trait in his nature the American farmer has bent his energies, and used his genius in the direction of mechanical improvement, rather than in the introduction of new methods founded on the correct application of underlying principles. And though our mechanical appliances, and their resulting modes of tillage are the marvel of Europe, in the application of science to the art of cultivation, in economical husbandry, we are far outstripped.

We have now witnessed the great underlying element, tending to produce universal agricultural failure unless its baneful effects are speedily recognized, and the remedy, agricultural education, in the application of scientific principles by the aid of intelligent practice, be applied to the correction of injurious methods, and the eradication of prejudice. We must therefore turn to the consideration of some of the local or individual causes for the failure of agricultural undertakings.

The amount of acrimony vented upon the weather as the cause of untold disaster to the farmer, is only another instance of the proneness of human nature to shirk responsibility for misfortune; though it is the uncomplaining recipient of many anathemas, and is made accountable for much of the want of success in farming operations, with it I shall have little to do, giving it no disparagement. The hand that "pours forth the unending flood of years," guides the elements, and controls their every action. Against this hand man's might is unavailing, and against it no complaints should be made. Though the weather may often cause a loss to the farmer, if he carefully examines the attendant circumstances, and gives particular attention to an analysis of himself, he will find that the elements alone are not responsible for the calamity; which by due heed and forethought, on his part, might have been prevented, or its destructiveness mitigated. In a word, were the farmers of our country better prepared, either by nature or by education for their undertaking, they would rise superior to many influences now holding them in thraldom.

If we scrutinize closely the various alleged reasons for discontent with farming, the real cause will almost invariably be found to exist in the cultivator himself.

To an inherent discontent with their calling may be attributed much of the want of success among farmers; why should the followers of agriculture be more given to detracting from the advantages and achievements of their compeers than the men engaged in other pursuits? Does not the fact that so many of them are farmers from necessity rather than choice account for the anomaly?

Many a farmer is such from force of circumstances, and not because he has ever shown any liking or particular fitness for his occupation. While on the other hand most professions are filled by men who have accepted them, not in consequence of the accident of birth or any similar irresponsible reason, but because of all the occupations of man this one seems best fitted for them, and holds out the greatest attractions. Not, but that events beyond our control often lead to the selection of any vocation rather than our own unbiased free will, but the farmer is much oftener the victim of such chance than is the follower of any other industry.

The result of this fact can be plainly traced on every record of American husbandry. Not loving his profession, what wonder that so many failures can be cited. Instead of accepting the position, and striving to advance the interests of the calling in which his lot is cast, and in time, not only overcoming his prejudices, but learning to respect and love his art, he too frequently gives little attention to the small details on which so much of agricultural prosperity depends; hurrying through his necessary farm operations, begrudging his soil, the care and skillful application which its products demand. Rather than exert himself in the interests of his farm, its crops, and himself, this unfortunate being gazes at the laborers in other fields, envies the fortunes sometimes made, and laments the failure of his crops, and the consequent ill success for which he has himself alone to thank.

One of the great producers of agricultural failure lies in the non-application, to the affairs of the farm, of those business principles essential to success in all pursuits. We can hardly admonish farmers for looking longingly at the instances of magnificent fortunes acquired in other undertakings, and yet we should not forget that for every case of this kind there are a hundred records of ruin, and that no occupation offers so many immunities as the cultivation of the soil. The remuneration and freedom from disaster in every calling is in direct proportion to the capital employed, and the skill used in its management.

Considering the unsystematic and unbusiness-like manner in which many of our farms are conducted, that more failures are not reported is almost marvelous, and can be accounted for only through the lavishness of nature.

I believe that, were the same stringent business rules in use in other professions, that were the same strict accounts kept, and careful attention given to every detail, it would be found that, even in point of pecuniary reward, agriculture distanced all her sister occupations; and with regard to the pleasures and freedom of county life as compared with the busy strife of the town, no comparison can be drawn.

If commercial pursuits were conducted in the loose, negligent manner in which many farms are managed, inevitable failure would be the result. Farmers, you have only to put into practice these true business principles, and a prime cause for agricultural disaster will vanish.

Among the reported failures of agricultural undertakings, none are so numerous as those narrating, apparently inexplicable, instances of the total or partial failure of a particular crop to return the reasonably expected abundance. We are told that the land was bountifully fertilized, that the seed was good, for it sprouted, that the crop was carefully tended, and that the season was evidently favorable; yet it either failed to mature, or, at harvest time, yielded but a fraction of the anticipated return.

The cause of these blasted hopes is sometimes traceable to one source, sometimes to another, but whatever may be the direct influence brought to bear, the real, prime reason for the disappointment will be found existing in the cultivator himself, or in circumstances over which he should, and might have control. Climate, insect pests, and meteorlogical conditions will generally account for most failures commented upon as unsolvable enigmas. Yet almost invariably had due care been exercised, had proper attention been given to all the details of cultivation, or if, above all, had the farmer been well grounded in the scientific principals underlying his procedures, and governing the elements and forces with which he has to battle: had he understood the history, needs, and characteristics of his soil and crop, much, if not all the subsequent damage would have been an impossibility.

Illustrations of this truth can be found on every hand; and I need not cite such well known instances as the application of research to the ravages of the Hessian fly, by the means of which, a simple change in the time for sowing wheat effects an annual saving to the people of America of twenty millions of dollars, and by which, from threatened universal failure and extinction, the wheat crop of our country supplies half the civilized world with bread.

I will confine myself to perhaps equally important, though less widely known, facts.

There recently appeared in several sections of the country what seemed to be a blight, affecting the finer grasses, and threatening to make their cultivation a total failure, compelling their being supplanted by clover, and the coarser grasses. As the trouble re-appeared the next year, a study of the phenomenon was instituted, which resulted in the finding of a minute insect secreted in the lower node of each deseased plant, and absorbing its life. The habits of the insect were noted, and it was ascertained that the eggs of the pest would never hatch before the middle of June, and hence, that an early harvest would generally anticipate the ravages, and attending failure of much of the hay crop in the affected regions.

It is a long-established custom with farmers to constantly cultivate soil that is too wet for growing crops, "keep it in motion," they say, that access of the air may remove the superabundant moisture, "dry it," in fact. The same practice is resorted to in time of drought, to retain the water; only the plan is reversed and the soil is not disturbed, lest the atmosphere extract the moisture. Within two years it has been conclusively proved that this theory and its resulting practice are totally incorrect.

Water moves upwards in the soil through capillary tubes, and the more perfect they are the greater the rapidity with which the moisture passes into the atmosphere. Cultivation destroys capillarity by disturbing the tubes; and hence, the more the soil is cultivated the less the amount of water it looses, and *vice versa.* As a result of this demonstration, the ordinary practice should be reversed, and the soil manipulated in dry weather, but allowed to remain untouched when too moist. Had farmers been acquainted with this theory before, the failure of many crops through seasons of drought or of too great moisture, might have been prevented.

For years there has been a peculiar, and little understood disease which occasionally attack tobacco, sometimes affecting only here and there a plant, at others rendering whole fields comparatively worthless. Sometimes it neglected certain localities for several seasons, and then reappeared in full vigor; not unfrequently devastating a field while one adjoining was entirely free. Its excentricities puzzled the wisest practitioners, and no escape from its effects was known.

The microscope has within a few years demonstrated as true, what had before been suspected, that the "calico," so named from the spotted appearance it gave the leaf, was a fungoid growth, and that, consequently, its ravages might be migitated by the application of sulphur. And now there is no necessity for a failure in the tobacco crop on account of the "calicoed leaf," resulting, no doubt, from meteorological influences.

In searching for the almost innumerable forces tending to detract from the success of tillage, we should never forget that agriculture, the subject with which we are dealing, is the most intricate of arts, in the proper prosecution of which are found more vitiating elements than enter into any other industry, rendering its successful conduction more difficult than other professions. The most abstruse principles of nature's laws are involved in the ordinary operations of the farm; each change of season, every shift, even, of the winds, every fall of rain, every variation of temperature, the very clouds floating in air or drifting across the disk of the sun, are among the manifold influences controlling the calling, and on a knowledge of which its failure or success may depend.

The most subtle problems of nature, the farmer is called upon to solve; not only this, but with them he is brought into daily cotact. Life, the highest, the grandest, and the most incomprehensible endowment of creation is the great force with which the farmer has constantly to deal, and which it is the object of his profession to propogate and foster.

Are we not justified then in claiming that to the inherent intricacies and magnitude of the principles underlying our vocation, many of its failures are due? Yet none of these difficulties are insurmountable; on the contrary, before a discipline in the fundamentals, equal to that brought to bear upon other professions, they would rapidly vanish.

All the facts on the subject under consideration trend in one direction; namely, that all failures in farming may be traced directly to one of two sources. Either natural or acquired inefficiency on the part of the farmer, which leads him to neglect some of the many elementsessential to success in his profession, or to a want on his part of a proper knowledge of the natural laws governing the actions of elements with which his vocation brings him in daily contact, and in accordance with which success may be achieved; but which, if transgressed, result in disaster.

Whatever may be the cause for a lack of fortune in any undertaking, the controling influence exists in the man himself, by timely attention to the results which may be molded by his will, in accordance with natural laws governed by unseen power.

PRIZE ESSAY.

No. II.—On Securing the least Suffering to Animals while they are being Transported and Slaughtered.

By G. A. SCHNEEBELI, *Easton, Pennsylvania.*

This subject, if conscientiously dealt with, may be accepted as the fundamental law and constitution of the Society for the Prevention of Cruelty to Animals, which embraces in its scope all efforts that can be made by human intellect to protect dumb brutes from unnecessary suffering, too often caused by willful neglect and malicious intent.

Various methods have already been resorted to to lessen the hardships of animals in transportation by railroad, yet the serious error of crowding too many beasts into one car is almost universally committed. The prevailing theory that such packing is necessary in order to avoid confusion and fighting amongst cattle is false in the extreme, and hundreds of animals have paid the penalty of such transportation with their lives. The construction of improved cattle cars is a point of vital importance, and suggestions may be in place as follows:

Every car for horned cattle destined to long journeys should positively be divided into four compartments, each to contain no more than five head of cattle.

Narrow water-troughs should be constructed, running along one side in each of these compartments, for the purpose of watering stock at the different locomotive watering stations, thus avoiding the frequent un- and re-loading of cattle, and greatly relieving much suffering from thirst during transportation in hot weather. These water-troughs may also serve the purpose of feeding. Sheep and swine will bear closer packing. They can comfortably be transported in double-tier cars: but the erection of troughs may also be suggested here as indispensable, water having a quieting and soothing influence on animals thus treated.

Two hundred sheep and one hundred swine should be the limit for a car load. Horse-cars should be heavily padded, and have narrow hay-ladders put up near the ceiling, yet not dispense with the water-trough.

In driving cattle long distances, forty miles per day should be considered the proper allowance, and water must be given at least twice during that time. In hot weather it would be advisable to reduce that estimate by ten miles. Fresh milk cows, with calves, should be driven no more than twenty miles per day, and the calf should be transferred on a wagon, which the cow will readily follow. Sheep and swine move rather slowly when in herds, and the allowance for them should be twenty miles per day.

For the local transportation of calves, sheep, and swine, the condition of the butcher's cart will bear a few comments. The barbarous practice of tying the legs of animals, and throwing them on the bottom of a cart without bedding of straw or anything of the kind, is cruel in the extreme, and should be abolished at once and forever. The best method is to use a lightly constructed frame-work of slats on a spring wagon, under which calves, sheep, or swine may be stored without tying, and thus given free use of their limbs. A very cheap and good contrivance for the purpose of conveying a few head at a time is a crockery crate, which can readily be obtained of any crockery merchant.

Throughout the country many different modes of slaughtering are in vogue. The extensive abattoirs in large cities furnish a good opportunity for observing the extraordinary quickness which prevails in the butchering of animals. Beeves are scarcely given time to shed their life blood before they are skinned and hung up while the flesh is yet quivering. In the slaughtering departments of large pork packing establishments the same error is committed. A description of the *modus operandi* may be in place. The first treatment in the process of butchering hogs is the stunning and stabbing operation. The pen capable of holding about one hundred hogs is slightly elevated above the scalding tank. The dimensions of the latter are about twenty-five feet in length, thirteen feet in width, and five feet deep. The tank is filled with water heated to a temperature of one hundred and fifty degrees.

The butcher enters the pen armed with a long handled hammer and begins his deadly work near the gate which opens into the scalding tank, striking at the foreheads of his victims and thus stunning them; they are then instantly seized by others who stand ready with knives to bleed them by severing the jugular vein. That accomplished, the gate is opened and the carcasses are conveyed into the tank by means of a sliding board. Several men are stationed along the sides of the tank, supplied with long handled iron hooks, and are constantly turning and drawing the carcasses toward the opposite end where they are scooped up by means of a large revolving rake, and deposited on a long table, one by one, as fast as the revolutions of the rake will permit, to be further disposed of.

Thus it will be seen that although perfectly legitimate in its action, the main thing to be condemned is the fearful haste during the operation which indeed seems to characterize modern labor in many things. That an error exists here may be readily perceived. For instance should the butcher fail to strike a sufficiently hard blow, the animal, though falling, will recover before many seconds, or, should the knife fail to reach the vital parts, it will only be half bled by the time the others have shed their life blood. Waiting, however, is quite out of the question, and away goes the animal to end his existance in a spasmodic struggle as the scalding water closes over his head. Of late the above described mode of killing has given place to a yet more scientific process on the question of speed, and six thousand hogs can be manipulated in twenty-four hours. The hogs are driven up an inclined plane which gradually slopes into a narrow passage-way in the upper story of the building. That is only wide enough to admit one animal at a time. On one side of the opening is stationed a man who fastens an iron clasp, which is attached to rope and pulley above, to the hind leg of the first victim. One jerk and the hog swings in mid air, ready to have the knife plunged into his vitals. Almost immediately after that has been done, the hog is dropped on a movable platform which is arranged in a slanting position, and revolves by means of an endless chain pulley, from that the hog slides to a lower platform of a similar construction, at the lower end of which is erected the scalding tank.

It is conceded that, of the hogs slaughtered by the latter described method, at least four fifths are scalded while yet alive; but to remonstrate with the pork-packer would only elicit a similar reply to one given by a prominent packer in a recent conversation on the subject. He remarked: "What are we going to do about it? If we must make more allowance of time for killing, it will advance the price of pork at least twenty per cent., and that, of all things, must be avoided, when competition is the order of the day."

The Jewish mode of killing cattle seems to be nothing less than downright cruelty, and would almost suggest an entire want of human sympathy for the sufferings of animals. This process is, however, conceded to be a religious law of ancient date, given by the Almighty, during the sojourn of Israel in the wilderness, and is, therefore, faithfully performed to the present day. The feet of the animal intended for slaughter are firmly bound together, and drawn upwards by means of a pulley, so that the animal lies squarely on its back, and the skin at the throat is well stretched. The "Rabbi" is present to perform the task of purifying. Armed with a broad-bladed knife of about thirty inches in length, and of razor sharpness, he draws it across the exposed throat of the animal three times in succession, that a free flow of blood may be obtained, in order to render the flesh free from all uncleanness, as prescribed in the ancient Jewish laws.

It, however, sometimes occurs that the arteries are not severed, notwithstanding the sharpness of the instrument of slaughter, and the operation must be repeated until the desired object is gained, thus causing the animal a shameful and cruel death.

To advise a remedy for such a practice or desistance from it would seem useless, as the Jews will positively not deviate from their time-honored custom.

Not only the professional butcher, in his treatment of animals, but the farm-yard furnishes an equal if not a greater number of aggravated cases of cruelty. The farmer tells his boys and hired help that to-morrow the heifer or bull is to be butchered for the winter beef; and butchering it is, in every sense of the word. No appliances of the slaughter-house being at hand, the animal is frequently tied closely to a tree to receive its death blow. In nine cases out of ten, it is not of sufficient force to stun, but only to enrage, and the infuriated beast bellows in a heartrending manner, while blow after blow is struck on his head. At length he falls, and from the cuts and slashes that are now made at the throat of the poor animal, a raw student might be supposed to be at work on a body in a dissecting-room. Hogs furnish famous sport in the barn-yard as targets for pistol or rifle practice, and many a farmer's lad boasts of having killed his game at the third shot. Were the first shot a fatal one, it would be a credit to the *sportsman.* Frequently a leg or the jaw is broken in the effort to make a "hog's" eye, but that is of little or no consequence "as they have to be killed anyhow."

Calves and sheep are likewise often disposed of in a careless and bungling manner. Instruction and reform are, indeed, needed in many rural districts in the art of professional butchering.

Unquestionably the quickest and most humane method is the so-called "necking practice;" that is, the severing of the spinal cord by means of a barb-pointed instrument called a butcher's dirk. To accomplish that end, a rope is fastened round the horns of the ox and drawn through a ring which is fastened on the floor of the slaughter-house, in order that the head may be drawn downward and the nape of the neck exposed more fully. It, however, requires an experienced and steady hand to hit precisely the right spot and sever the spinal cord. That done, the animal falls instantly, unable to make another move, and is entirely insensible to pain, all sensation of the nervous system ceasing immediately upon its severance from the brain. The jugular vein must be opened at once, to insure a free flow of blood, and thus the animal dies the easiest death that human hands and brains can devise. Calves can be treated in a somewhat similar manner, differing only in cutting the throat, first bending the head backward, and thus affording a good opportunity for severing the spinal cord in the neck joint from the inside. Sheep are most quickly killed by opening the jugular vein and breaking their necks by a quick backward motion.

The easiest conceivable death for hogs is to stab the heart with a long narrow dirk knife, especially manufactured for the purpose. The animal will quickly rise to its feet after having received its death-thrust, but almost immediately after falls again and dies in about forty seconds.

Being solicited by the Society for the Prevention of Cruelty to Animals, the attention of eminent scientists has been called to the feasibility of killing animals of slaughter instantaneously, by means of the electric battery or the vacuum chamber. Such procedings may as well be discarded first as last, as being highly injurious to the marketable and healthy condition of the flesh, inasmuch as when deprived of life in the above manner the blood congeals very quickly, free bleeding is retarded at once, and the carcass bloats in a short time, thus rendering the flesh totally unfit for food.

In England, France, and Germany the profession of butchering is treated as a science. The anatomy of animals is closely studied, and the butcher's apprentice is obliged to undergo an examination, almost as rigid as that required of medical students.

Let those engaged in butchering take pattern therefrom. Let them be guided by common sense and humane reasoning, and the profession will assume a higher rank in the occupations of daily life.

The transportation of wild amimals, intended for exhibition, may also come under the head of this subject; but is hardly necessary to dwell thereupon, as the best of care and attention is generally accorded them, it being to the interest of exhibitors to have their animals in fine condition.

ESSAY.

No. III.—On how the Pupils of our Graded and Normal Schools may be Taught the Theory and Practice of Agriculture.

By H. E. STOCKBRIDGE, *Amherst, Massachusetts.*

The last quarter of a century has witnessed enormous strides in agricultural advancement; and though in many departments the cultivators of the soil have distanced the followers of other callings in the march of progress, one element of vital importance, not only to agriculturists, but to our entire country, has failed to receive due attention, and, unless American farmers soon rally round the standard of popular agricultural education, retrogression will be the result. The agriculture of a people always has been, and must continue to be, the exponent of their civilization. Only by speedy devotion to the dissemination of general agricultural information among all classes of society, can we guard against staying the wave of improvement, and ensuing wide-spread stagnation.

It is a remarkable fact that a nation possessing so extensive a system of public schools, the most eminent journalists and jurists of our times, a country governed by the will of the people, whose scientists, authors, divines, and statesmen have received universal homage, should fall so far behind her European sisters in recognition of the absolute necessity for a general knowledge of the principles on which the art of production rests. In this respect, France and Germany are so far our superiors, that "comparisons are odious."

Europe has accepted the fact that the very existence of her people depends on the diffusion of agricultural education among the masses, and as a result not only have hundreds of agricultural colleges been established, but special schools for instruction in particular branches of husbandry exist, and in several countries a system of agricultural instruction has been introduced into the public schools, the consequence of which can be traced on every feature of European economy. France containing less territory than the single State of Texas, not only contrives to feed her thirty-eight millions of people, but annually exports more bread-stuffs than do the entire United States.

The cause for this great disparity can be found in the difference in the technical education of the cultivators of the soil here and there.

Perhaps if the reason for American neglect of this mighty problem were understood, its solution would be less difficult. The cause, I think, is suggested by the old adage: "Necessity is the mother of invention." The very life of European population compelled the innovation. For us no such necessity has yet arisen. Let us be in advance of the times rather than wait till existence imperatively demands the course already staring us in the face.

Nature is a bountiful provider, and upon her we have relied without hesitation. The untilled soil of the new world contained within its bosom vast stores of nutrition, the accumulation of ages free from the devastating hand of civilized man. The broad expanse of our country offered a welcome, and assured support to all, no incentive to scientific, systematic, economical cultivation existed. The American people are nomadic in their tendencies, and have found it far easier to bring fresh fields under subjugation than to restore the exhausted fertility of land too severely used; but the season for rude agriculture has passed, and former wastefulness will bring future ruin, unless some means be found to stay the course of events rapidly bearing us toward the dilemma from which Europe has just extricated herself. Let us profit by her experience, and prepare for the events foreshadowed by history. Even now our people are congregating in vast centers of population, thousands of once fertile farms are comparatively unproductive, and untold millions of acres yet wait the coming of the cultivator, our shores are receiving thousands of immigrants every week to swell the multitudes seeking homes, where furrow has never yet been turned.

The only path to safety lies through a knowledge of the theory and practice of agriculture; it penetrates a region little known, and along its course scarcely a blaze has yet been made.

The methods in vogue in cramped, crowded monarchies cannot be followed in our expansive republic. Caste, which enters so largely into European institutions, is a minusquantity in America. People accustomed to compulsory military education and service, differ greatly from self-controlling self-governing Americans, and a school system well suited to one would not be tolerated by the other. Therefore, though of interest to the student of agriculture, a study of European methods can but immaterially aid us in our undertaking.

In France, the criterion of Europe, the system of agricultural education may be said to be divided into five distinct departments. First, theoretical and practical instruction in the common schools of the land. Many of them possess small estates, where the out of-doors art is taught; and, as the culture is mostly of a garden nature, both girls and boys take part. Next come the numerous schools and colleges devoted to the exclusive interests of the tillers of the soil. On a level with these are frequent professional institutions devoted to some specialty of the art of husbandry, stock-raising, forestry, and gardening being the principal subjects pursued. Last comes the great instution of all, that which places the science of agriculture far in advance of all other callings, the National Agricultural University at Grignon, which plays a part as important to French agriculture as does West Point to American soldiery.

It is only the first step in this progression that possesses particular interest for us, and it serves hardly more than the purpose of assuring us that the principles involved have passed beyond the phase of experiment, and that agricultural instruction may yet form a prominent feature in our common school system.

It is a purely American anomaly which admits of the establishment of professional schools for the undivided support of the law, of theology, and of medicine, yet allows the farmer to follow the ancient methods of his ancestors, with, until very recently, no institutions adapted to the requirements of his calling; which furnishes the pupils in its public schools with instruction in mechanics and navigation, but neglects the rudiments of the art on which all others depend, and which of them all alone can survive the downfall of every other industry; which offers to youth free tuition in Latin and Greek, though they remain ignorant of the first principles governing the production of the food they consume, and the clothes they wear, of the art in which six-tenths of them must inevitably pass their lives, and furnish sustenance for themselves and the remaining four-tenths.

Our demand for the introduction, to the graded and normal schools of the country, of studies more likely to prove of subsequent practical benefit to the pupils, particularly of such fundamental agriculture as shall the better enable them to pursue the science further at a distinct agricultural college, or grasp more readily the facts brought before them in active life, may be met with the reply: "Our agriculture is doing well enough now; our children are as capable as the children of generations ago, and they succeeded in life. We are, to-day, notwithstanding our lack of primary agricultural information, and neglect of the scientific principles involved in our vocation, exporting food to support the upholders of common school agricultural instruction. Where, then, is the force of your argument?"

I reply that there is no such thing as a passive existence, we must either advance or retreat, and progress demands improvement. And though we largely supply the food of Europe, we import from her millions of dollars' worth of agricultural products, noticeably sugar, every year; yet, though the bread of Europeans is, much of it, grown by Americans, an acre of their soil supports, on an average, ten times the population that does the same amount of ours; this too in face of the fact that one-tenth of her entire adult male population are non-producing soldiers. And I claim that this great superiority is chiefly due to the fact that science has regulated theory, and that both have been applied to the correction and advancement of practice; and that, were the grand elements of science, which underlie all successful cultivation, instilled into the minds of American youth, the result would shortly be such an epoch of prosperity as never yet dawned on our country.

The most suitable method for accomplishing this great end, is through the introduction of the study of agriculture to the schools of the land. But how?

Now we come to the direct consideration of ways and means. First, with what class of schools and scholars should the introduction be made? I am convinced that the pupils capable of reaping the greatest advantage from the study of agriculture, are those who have already pursued elementary chemistry, and studies of similar rank, or are qualified so to do; and also that in no way can instruction in these sciences be so pleasantly or profitably imparted, as in their relations to the soil. The object of this new undertaking, is not to create farmers of all school children, but to acquaint them with the elements of agricultural science, in such a manner that it may afterwards be of practical utility in any walk of life; giving particular attention to the relations of agriculture to other industries, and to national economy. Aside from these facts, a large majority of the school pupils of the land are country bred, and hence familiar to a certain extent with all farm proceedings. Consequently, should they afterwards follow the calling of agriculture, no difficulty would be experienced in applying the science obtained in the class-room. Yet, I do not question the advantages sure to accrue from a systematic exposition, under competent teachers, of the school-room theories, but many schools *must* be situated where it is absolutely impossible to obtain illustrative ground. As we are dealing only with such principles as are capable of universal application, we must discard the idea, desirable as it may be, of supplying the schools with land; nevertheless, the education proposed will not lack practicability.

Wherever feasible, agricultural gardens should be maintained, in connection with the in-door study. Here should be grown specimens of all the important agricultural plants, for the purpose of familiarizing the pupils with them, and illustrating the theoretical teachings. And the slight necessary labor could be performed by the class with very great benefit, acquainting them with soils, implements, and methods. The means for additional instruction exists on every side, in the farms and farmers of the land, to which regular visits with an instructor should be made, and the various operations studied, in their relations to the theoretical knowledge already obtained. Time so spent, would be both very pleasantly and profitably passed by all participants.

Correct theory can never conflict with practice; but the great difficulty to be surmounted, is in the methods for supplying the true instruction in principles and theory. Who possesses the necessary knowledge? Who can properly teach the elements of agriculture? What means shall be resorted to for imparting scientific and theoretical information concerning the fundamental laws on which all true husbandry rests? Are there no text-books which will fill the requirements? No. Everything must be produced as we advance.

After the system has been introduced to the normal schools of the country, there will be no dearth of teachers; but now, at the start, nothing exists, all is to be created. Before the instruction can be given, a knowledge of the subject treated, or its equivalent, must be supplied the teacher. Our agricultural colleges are the resource on which we must rely.

The teachers in the graded schools of the land are, and should continue to be, women; and the doors of all our successful colleges of agriculture are open to them. Here, then, is the fountain from which the intellectual soil must be irrigated. However, this resort should be but temporary, for perfect as the instruction may be in its own line, these institutions were not established for the education of teachers; but we have a class of schools existing for this specific purpose, and on them we should depend. Therefore, every normal school of the country should possess a professorship of agriculture, and furnish the future professional teacher with a thorough ground-work of agricultural science and practice.

The instructors for this department should properly eminate from the agricultural college.

It may be claimed against this system that a woman can never become proficient as an instructor in agriculture. On the contrary, I claim that there is no more reason for a lady's being unable to properly teach the science of production, than botany, natural history, or physiology; and there are many reasons why this instruction in fundamental agriculture should be left in her hands. But how shall this system be set in motion? Simply by creating a demand for it. If really convinced that the interests of state or nation require a diffusion of agricultural knowledge among the youth of the land, farmers, and all interested in American prosperity! step to the front, and call for the enactment of a law not *compelling* such instruction, but *offering* it *freely* to whoever wishes for its benefits, and requiring school authorities to furnish it whenever desired.

Now as the first instruction under the new régime will be in the hands of novices, some proper text-book authority and guide is inevitable. As soon as a demand for such a commodity is well established, there will be no more lack of agricultural text-books than there is to-day of popular chemistries. There have already been several attempts to forestall this demand. There is no lack of talent; teachers, writers, and practitioners of agriculture exist; but till a real call for the book appears these men can be better employed than in writing that for which, as yet, the remuneration must be small, indeed.

As a consequence only such abortions as *Blake's Agriculture for Schools*, and *Flint's and Emerson's Manual* have been produced; not but that these books are well enough in their way, for their authors have succeeded in compiling much valuable information, but they have utterly failed in their efforts at bringing forth a popular text-book of agriculture, and at the same time make it of practical service.

For the students in advanced courses there are many works of inestimable value. Nearly every crop and every operation of the farm has been authoritatively treated, and thorough students of agricultural science will find the whole field masterfully covered by *Pendleton's Scientific Agriculture.*

The demand of the times is for a work that shall not be abstruce or difficult of comprehension, nor yet so elementary as to fail of real worth, a book which shall furnish the pupils of our graded schools with a thorough fundamental knowledge of the practice and theory of agriculture, which shall treat of principles and their application.

The material for such a work exists. If all the requirements for its formation cannot be found in one man, united efforts will produce it. The question is, how shall these forces be called into action? I believe by simply guaranteeing the author of the work remuneration for the time spent in its production.

The cause of agriculture would be greatly benefited by the offer of a prize for the text-book which shall most fully supply our needs; if legislative aid fails, some organization founded in the interest of agriculture or humanity should take the matter in hand. Granting the reward only to the author of a work filling the requirements. Wherever the teachers are qualified, the book should serve simply as the foundation for supplemental oral and object instruction.

Though the accomplishment of our purpose necessitates nothing less than a complete revolution in public opinion, I see nothing to prevent its achievement. As the minute fissure in a dike may result in inundation, so only one small opening is all that is needed to break down the embankments of prejudice, and let the vivifying waters of progress cover the land.

Only one step is needed. Farmers and every one interested in American prosperity, through public opinion legislative recognition of this truth can be obtained, and all pupils so desiring receive instruction in these principles of vital importance. Remember that whatever popular sentiment requires, must be accomplished, and, toward guiding this popular opinion, your first efforts should be directed. I believe that the subject only requires to be brought authoritatively before the public mind to receive universal sanction.

The cost of this innovation will be ridiculously small when its results are considered. No new institutions are desired, simply one new professorship in the established normal schools of the land, the maintenance of which might necessitate an annual outlay of twelve hundred dollars in each institution so benefited. The salaries of the school teachers would need little, if any increase, for the time devoted to this vital study might be advantageously taken from that now bestowed on abstruse mathematics or the dead languages. The only other outgo would be in the reward offered as an inducement for the publication of a suitable text-book.

In return for this trifling expense, what are we to receive? We are to possess the boon of men and women educated in the great principles which control all nature, in the elements of the art on which prosperity rests, and from which all industries receive life; possessing a knowledge of practical affairs, and equipped for life's battles, in whatever sphere they may be destined to occur. Can the value of this information, or the great good sure to accrue from this education, in the union of theory and practice, the application of true science to daily vocation, be over-estimated? Can we not afford this universal, agricultural, industrial, useful education? Reason answers, yes! Progress requires it, economy demands it, and history insists upon it.

The accomplishment of the end toward which we are striving is only a matter of time; and the ultimate acceptance of our position is foreshadowed on every page of history, can be read on every leaf of nature. A hundred years ago, and not an institution in the world had ever professed to bestow the slightest attention upon the subject of agriculture, and only dreamers had thought of the possibility of an education adapted to the special requirements of the tillers of the soil; to-day, the civilized world accepts the truth of the visions they beheld. Half a century ago, no country of Europe had introduced the study of agriculture to the pupils of its public schools; now the system is universal. It is barely a generation since the first agricultural college in the new world was struggling into a feeble existence; to-day every State in the Union has placed its approval upon the movement then inaugurated.

Surely these facts are auguries of the time for which anxious eyes already scan the agricultural horizon.

The world moves on, and the time rapidly approaches when agricultural education will be the recognized path to national prosperity. Then will the common schools of our country offer free opportunity to receive this boon, and Ceres reign triumphant.

ESSAY.

No. IV.—On Co-operative Agriculture, by Landlord and Tenant on the same farm, by Separate Families on Neighboring Farms, and by Communities of Families on Large Estates.

By P. H. JACOBS, *Hammonton*, *New Jersey*.

In discussing the question of co-operative agriculture, I do so not aim so much to call public attention to the many advantages of co-operation, as to assist in devising some *method* by which so desirable a result may be attained. And before considering this subject, it may be best for me to anticipate the objections of many by stating that there is a great difference between co-operative communities, and the so-called communistic societies with which the public mind is familiar. It is true the word communism is repulsive, but that is due to the application of the term in an incorrect sense. Communism truly refers to habitation by communities, but the lawless examples exhibited by some of its pretended advocates have not elevated it in public opinion. There are many very cogent reasons why co-operation is not communism, as communism is at present understood. Communism entirely destroys the individuality of its members, while co-operation preserves it. The one compels an individual to abandon all semblance of former modes of living, to yield his wishes to others, and really to be an object of charity in a place where he should be free, equal, and able to insist upon his demands by right.

I need not here refer to the *power* of co-operation as applied to agriculture, for that would be almost superfluous. The ability to procure implements for more effective use, better educational privileges, a closer companionship and social union, better purchasing facilities, better opportunities to realize promptly an advance in the products of the members, are some of the great advantages which never can be enjoyed by the individual farmer.

As regards landlord and tenant, it is our duty to study the subject by first throwing aside any prejudices in our minds respecting any particular advantages to be secured by either party in preference to the other. Hence, we discuss it on the simple plan of equal and exact justice to both. Nearly every locality has its system of arrangement between landlord and tenant, and doubt is thus thrown on the general adaptability of any plan that may be devised, owing to difference of special crops, diversity of soils, and sections of territory to be cultivated. This is obviated almost entirely by cooperation by families on large estates. The individual characters of both landlord and tenant are important factors in the whole sum of requirements to be examined, leaving it still more difficult to specify particular methods.

The landlord would, no doubt, estimate his land and buildings as so much cash capital, which he has a right to do. The tenant, in using the farm, has in his possession just so much actual capital, borrowed from the landlord, in the shape of land and buildings. It is at once seen that, no matter what the actual value of such farm may be, the landlord is first entitled to interest on such actual value. This interest is, to take another view of it, the *wages* of capital, and hence, we may conclude, the tenant discharges the debt due the landlord for the farm when he pays him a sum equal to the interest on the same. The tenant, on the other part, is represented by capital in the shape of implements, stock, &c., and he is in turn entitled to interest on his capital invested. The *labor* of the tenant is is the *interest* on the capital used by the individual; that is, if a tenant does work to the amount of say six hundred dollars, such sum would show that the tenant himself, *in person* represents a capital of ten thousand dollars, which he uses on the farm in the shape of labor. But many landlords furnish the implements and stock, which throws a difficulty in the way of discussing the subject thoroughly. The proposition may be thus stated: that it does not matter what terms the landlord and tenant may make between themselves, any method that pays the landlord interest on his capital invested, and the laborer, also, for his capital in the shape of labor and stock, leaves all earnings over and above that sum (after mutual agreement for actual improvement to the farm by the tenant or loss through insufficient culture.) to be divided between them according to the capital, physical and material, invested by each.

The co-operation of families on neighboring farms, and of communities on large estates, may be made successful by methods so similar, that, in order to be as brief as possible, I will somewhat combine them. This method of co-operation is applicable, also, in a certain degree, to the working of farms by landlords and tenants.

The great difficulty heretofore in co-operative agriculture has been in the apportionment of labor, remuneration of labor, division of profits, idleness and want of discipline among members, and the preservation of family ties, rights, and privileges, as well as in the lack of enjoyments derived under the present system of individual farming.

In all histories of co-operation there has been shown the tendency to congregate under the *one house* plan, not from choice, but from the too sanguine disposition on the part of the originators to go to an extreme. Such extreme, far from being beneficial, has rather retarded the enterprise. I maintain that co-operative agriculture can be conducted successfully, without changing our present system of single homes and individual family relations, at the same time giving greater privileges and advantages: and as my motive is to show a *method*, I repeat that the *advantages* of co-operation are too well known to mention here.

The location being chosen, and a co-operative association organized, it would probably be a more complete explanation of my plan were I to illustrate it. It makes no difference what the number of families may be, but we will suppose it to be one hundred. In some instances it may be necessary to procure a charter, and I believe that any effort on the part of the State Agricultural Society to procure a law for promoting the formation of co-operative societies, giving them corporate privileges, would be of great advantage. We may suppose these one hundred families to represent a capital of $50,000, or $500 to each family. I am not limiting the amount of capital, for that will have to meet the requirements; but, as I am merely illustrating, my figures will not change the merits of the method. Each family should have its separate house for a home, with a fair-sized lot or yard. The houses might be constructed in a manner together, by building them in twos, with the excess of the ground on the sides. They should be built on streets not over one square in length, running east and west, and, if necessary, also north and south, with the ends of them closing on a square of ground in the center. That is, the ends of the streets (or beginning, if the term suits better,) should start from a central square, similar in plan to that in which the streets run out in all directions from Franklin or Washington squares, in the city of Philadelphia. These houses and lots would be on and a part of the farm, and would, consequently, be owned by the association, but no objection could be urged against their being owned in fee by the individual, if a proper mode of withdrawal be inserted in the by-laws of the association. In the centre of the square should be the workshops, barns, stables, school-house, library, &c., or the same privileges may be combined, for small communities, under one building. I mention this plan of laying off the village as an example of having the families near together, without the necessity of all of them being under one roof. Of course, there are better plans, perhaps, but this is one. If there are any persons in the association who are unmarried, they could have board at a hotel, which might be conducted by the association. In fact, all operations are to be conducted by the association, not only in buying the needed supplies, but in selling products, as well as in regulating and conducting all work on the farm.

Capital, in an association of this kind, should have no recognition except to draw the lawful interest. In this case, when interest has been paid to capital, it has received its *wages* and is of no further benefit. It is not able of itself to produce anything without labor, and, to take a broad and fair view of that subject, it is really paid all the benefit it confers when it has received its interest. Each person, man, woman, and child, should be paid wages by the association for all work done, each according to his or her ability and usefulness without regard to age or sex. Thus an idler, or unprofitable person, would only receive what he earned, and no more. The profits, supposing a dividend to be declared yearly, (or quarterly, as the case may be,) should be divided among the members according to the amount of LABOR performed by each, and, to make this plainer, suppose A to have done work during the year to the amount of $500, and B being not so industrious, to have earned only $250, and a dividend for the year is declared of ten per cent., labor being the basis. It is clear that A is entitled to $50 as his share of the dividend, and B to only $25, for, in truth and right, A has really produced, as a member of the association, just twice as much as B. We see, then, that the inducement is held out to industry, and the idle member can in no manner injure anyone but himself.

The hotel could be conducted, along with a store, (which all *co-operative* associations should have for the use of its members,) on the Rochdale system. I give here the Rochdale system of co-operative stores for the information of those not familiar with them. Every person who buys an article from one of these stores receives a check representing the amount of his purchase. He gets one of these checks every time he goes to the store. Quarterly they declare a dividend, *only on purchases.* If a person, during a quarterly term, has checks amounting to, say $50, and a dividend of, say ten per cent. is declared, he receives as his share of the profits of the store $5, while the person who has bought only $25 in goods from the store receives only $2 50. Capital, which is the money placed in the store, first receives interest before any dividend is declared, and hence we see that he who has the more capital receives the more interest, while he who purchases the more goods receives the more profit or dividend. We can easily discern that by such a system every one receives *his own and nothing else*, and it is also made very plain to us that it is an utter impossibility for one individual to receive what he does not earn, or monopolize for his own sordid purposes that which is fairly and honestly another's. It brings to view the true relations of capital and labor, which are inseparable, and while it demonstrates the fact that capital and labor are one and the same when the laborer owns the capital, it further shows how wide is the difference between *capitalist* and *laborer* when they are two distinct individuals.

The security of the capital invested in a co-operative agricultural association is another very important matter for consideration. Perhaps no single member would be able to furnish a guarantee against misappropriation or embezzlement, and I am sure no sound business farmer would like to engage in an enterprise without a knowledge of the safety of his venture. It seems to me that every member should be a treasurer. If the members are the *owners* of their separate homes so much the better, but the application is the same. After all necessary material has been purchased, the surplus of capital, or rather that which is strictly devoted to floating or immediate business, should be retained by the members until assessed. The mode I allude to is, that if $1,000 were required for any special purpose, an assessment of $10 on each member of the one hundred would produce that sum, which, while it would seem like calling on the members from time to time, would really be calling out for use capital remaining and left in their hands until required. Certainly no inducement to wrong can be held out to any one by this simple process.

The power of co-operation is illustrated in the great purchasing power of a combination of families compared with that of the single individual. The choice of the best markets for disposing of products, the governing of the system of educating children, and even of making them profitable by giving them shorter hours of study, and, in addition to hours of play and recreation, some necessary, light, profitable work, which might be to them a pleasure. A great many articles necessary to be had, could be manufactured on the farm, not only such as wagons and implements, but clothing, hats, shoes, &c. A library and reading-room would cheapen reading matter, and make the evening hours happy, while city life and the advantages of congregation and union would be realized on the farm.

Once again I will refer to the single house as a better method of life for separate families than that of a common building. In most communities, such as the Shakers and others, an individual cannot supply that inner demand for individual possession, beauty, and adornment. In a co-operative community, he can have his home beautified, keep poultry, have a garden if preferred, and other comforts not necessary to mention here. It is the selfish, uncharitable system, the complete swallowing up, as it seems, of the individual, that makes the plan known as communism, odious, and obnoxious.

There really is no change in the conditions of the members of an association working under the co-operative plan, from those to which they are now accustomed. For proof of this, suppose some large capitalist should offer to a certain number of workingmen the privilege of joining him in working a large farm, he paying them wages, building them houses, and also selling them supplies from a store owned and operated by him. We well know it is not usually the case for a capitalist to divide his profits with his workmen. A co-operative association, owned by its members and controlled by their votes, differs from this only by the absence of a capitalist.

The productions of a co-operative community find a home market somewhat. The members themselves become purchasers, and, to be brief, I will simply state that a co-operative association needs only to sell over and above that which the members and their families do not want from the co-operative store.

The want of ready money can also be regulated or supplied by a check system, by pass books, or any plan best suited to facilitate the trading at the association store, the wages of the members, or the amounts due them, being at all times a sufficient security.

A better system of agriculture would be practiced. More thought and care would be given to the complete saving of manure, chemistry be called to aid as an adjunct, more thorough tillage, better stock, and more complete adaptation to requirements of soils. Even the labor of the women would be lessened, by sending their orders to the hotel for ready-cooked food, and by having the washing and other heavy work done at suitable places. The saving in a matter of this kind, by leaving much female and young labor to be turned into more profitable channels, would be no small amount. New machines and farming utensils, now almost unknown to some farmers, would assist in so increasing the value of the yield over that produced by human labor as to completely dwarf the present individual enterprises in the way of remuneration.

The officers, directors, and laborers should serve in their respective allotted places and spheres of labor so long as each may be required. Frequent changes of officers should be avoided, and they should all be chosen to serve during good behavior, subject to removal at any time. Discipline might be enforced by fines and penalties. Should a member desire to withdraw, the association should return to him all that he has invested in the enterprise, first providing, however, for contingencies of such nature by receiving due notice from the member of such intention on his part, the better to enable the association to act towards him with fairness and equity.

Co-operation means cash. No system that allows buying or selling on credit is secure, and any tendency to create debt, unless governed by good judgment and wisdom, is usually fatal. Should co-operation be desired by those who are unable to procure the necessary capital, there is no reason why men of capital should not join with the workers, and conduct farming on large estates, for the capital would be safely and securely invested on on the farm and in the stock, while the capitalist would not only have a voice in giving counsel and advice, but could also act as treasurer for the association, the members being secured against loss from the fact of having no capital of their own invested, and even if the members were assessed ten dollars each, in order to use one thousand dollars, and some misfortune should occasion a loss of the whole amount, it is clear that, while the loss would seem to be large in one respect, yet, when we view it from another point, it is very light on each individual member, for while co-operation assists in the profits it also divides the losses. I believe that with the advantages of co-operative labor, the immense power of superior machinery, the special, detailed, systematic method of culture, the alloted and appointed duty of each squad of workers, the extra selection and care of the best breeds of stock, and the great economy to be gained by the *interested* attention that would be given by every member, no investment is safer for capital. The almost certain security from sudden fluctuations of stocks, a partial home market for production, and the power of self-regulation, places the venture of capital, in enterprises of this nature, far above any other.

There is no reason why capital should not *invite* labor of this character. Experience in the past ten years in Great Britain has demonstrated the fact that in no case has the competitive wages system of labor been able to compete with that in which a share of the profits of the enterprise in which they may be engaged is enjoyed by the workmen.

In every branch of industry the tendency to combine and congregate crops out, and works well, and it seems unwise in farmers to isolate themselves and families from advantages and enjoyments that might be had with pleasure and profit to the individuals concerned, and an improvement and benefit to the entire community. Our great cities might partly be emptied of their surplus population by men of capital, and it put to profitable employment, elevating them morally, and adding to the general happiness and comfort of all.

Much land, now awaiting culture for want of capital, could, by a friendly, true union of men of capital and laborers, be brought into use, and with benefit to the State, the operators, and the people at large. The only difficulty, heretofore, has been with the laborers, and not with the capitalists. Show the way, and, no doubt, the path of prosperity will be gladly followed.

PRIZE ESSAY.

No. V.—On how the Students of our Agricultural Colleges can be best Prepared and Induced to choose the Profession of Agriculture.

By H. E. STOCKBRIDGE, *Amherst*, *Massachusetts.*

In one of Switzerland's fertile valleys, during the yaer 1799, was founded an institution whose offspring are scattered over three continents, and to whose principles the civilized world to-day yields allegiance.

Though less than a century has passed since the necessity for higher agricultural education was recognized, and the village of Hofwyl received the first agricultural college in the world's history, twelve hundred similar institutions in Europe testify to the fruitfulness of the seed there sown, while thirty-five scions, more or less remote, are nourished by American soil, and two wandering children have found homes in far-away Japan. No thoughtful mind now questions the importance of agricultural education, or the benefits to be derived from institutions devoted to the exclusive interests of the tillers of the soil. Their position in the educational system of our country is firmly established, and attention is now turned towards solving the problem of the highest development of these colleges, and towards devising means by which the primary objects of their creation can be more perfectly secured. Skepticism concerning the usefulness of the agricultural college no longer exists; but in its place occur complaints that the institutions are not confining themselves exclusively to their particular field; in fact, that many of the young men who have received the advantages of an agricultural education fail to return to the farm, upon graduation, and there put into practice the precepts instilled by the four years' training of an agricultural *alma mater*.

That this condition of affairs exists, to a certain extent, there is no gainsaying, and though many staunch defenders of the colleges fail to lament this phase of their condition, with them we have not to deal. It is our province simply to ascertain, if possible, how this condition, good or bad, can be changed, and to offer a few suggestions toward the solution of the problem involving the greatest good of the American agricultural college.

That we may more intelligently treat of the future of these institutions, let us take a cursory glance at their past.

It was but little more than a hundred years ago that the first idea of even the possibility of a higher agricultural education was broached, when, in 1775, M. l'Abbe Rosier advocated the establishment of schools of agriculture; but through popular incredulity he failed of governmental support, and thus France lost the honor of being pioneer in the cause rapidly approaching universal espousal.

The last year of the eighteenth century witnessed the first successful venture in this untilled field; and though two schools of agriculture were then established, the one at Hofwyl soon died of constitutional apathy, but the one founded a little later at Krumau, in Austria, still flourishes, a monument to Teutonic steadfastness, and the Mecca toward which the eyes of generations yet to receive blessings from the principles there consecrated, will thankfully, if not reverently turn.

Europe, with her crowded population, was in prime condition to receive the seed sown at Hofwyl, and germinated at Kruman, and it soon spread broadcast throughout the land. But new, radical America offered little encouragement to the tender seedling; though attention was given to the subject of agricultural education as early as 1817, no systematic attempt toward the establishment of an institution to embrace the sentiments expressed, was made till 1849, when President Hitchcock, of Amherst College, was sent to Europe, at the expense of the State of Massachusetts, to investigate the system of agricultural education there in vogue. A year was spent in performing the duty, and then Dr. H. reported to the Legislature in favor of establishing a farm school in the old "Bay State." To its honor be it said that the Senate passed a bill incorporating an agricultural school; but the ground was not yet ready for the seed, and the House of Representatives by its failure to concur, robbed Massachusetts of the honor of possessing the first school of agriculture in the western hemisphere.

The principles thus spurned in New England, found more ready acceptance elsewhere, and, following the path of the setting sun, were welcomed to the soils of Pennsylvania, Michigan, and Iowa.

Deeply impressed with the possibilities of the undertaking so unpropitiously received by the general court of Massachusetts, the men having the success of the new departure so deeply at heart were far from giving way before the force of circumstances, and though chagrined at the action of their Legislature, were more than ever determined to give this European plant fair trial in our less genial climate, and proceeded independently toward the consummation of their plans.

The agitation begun on the shores of Massachusetts Bay spread over the boundary-line into the Green Mountain State; and convinced of the correctness of the principles involved, Congressman Morrill, of Vermont, opened a new and greatly improved path toward success, by presenting to Congress, in 1858, a bill for the endowment of a college in each State of the Union, whose object should be the advancement of agriculture and the mechanics acts. Though the bill passed both branches of Congress, it failed to receive the sanction of Pennsylvania's President son. And thus the honor of giving to the farmers of America nationally endowed colleges for their especial benefit, was reserved for the hand that signed the emancipation proclamation.

Far from being discouraged at his failure of success, Mr. Morrill, who had meanwhile been advanced to the Senate, brought before that body in

1862, and saw become a law of the country, a bill giving to every loyal State an amount of public land equal to thirty thousand acres for each of her Senators and Representatives in Congress. The funds from the sale of the same were to form the endowment of "at least one college whose leading object shall be, without excluding other classical and scientific studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in order to promote the liberal education of the industrial classes and professions of life."

Thus, after long years of waiting, America became conscious of the necessity of the times, and a grand system of industrial education became inaugurated, whose chief exponent exists in the nationally endowed agricultural college.

No sooner had congressional aid been assured, than apathy turned into feverish interest, and State followed State in rapid succession, eagerly espousing the cause of industrial education, receiving their "land-grants," and in return obligating themselves to establish and maintain forever institutions within the limits of the law: First to fall into line were the three States already possessing agricultural institutions, and now thoroughly aroused Massachusetts. These pioneers were followed at intervals by most of the other States, till to-day more than a score of strictly "land-grant" colleges exist, while many sister institutions are scattered over the land; and the agricultural college has become a firmly established characteristic of our agriculture. It has not only made itself felt as a powerful factor in the educational system, and future prosperity of the country, but lines from it may even now be traced on the tablets of science.

Let us glance briefly at the present condition of the institutions with which we have to deal, and ascertain, if possible, the portal through which improvement may be reached. The state of public opinion throughout the country before Senator Morrill opened the door to progress, and the sudden transition from a state of unconcern to one of intense enthusiasm concerning industrial education, as soon as opportunity was thereby offered for receiving aid from the nation's treasury, show conclusively that, though the demand for higher agricultural education existed in its primary form, the time for natural maturity had not arrived, that the sudden growth was an unhealthy one, and that these colleges, like the family of their mushroom prototype, contains noxious members.

The receipt of possible hundreds of thousands of dollars in government aid was a prize worth striving for, and as is far too frequently the case with legislative appropriations, sometimes became perverted from its proper channel, and was either absorbed by political shysters, by ignorant or unskillful management on the part of its overseers, or, as was too often its fate, went to fill the coffers of already established institutions, which afterwards utterly ignored the existence of the farmer, or looked upon him as their predestined prey. And what has been the result? Every State in the Union has received the national aid, and taken upon itself the resulting obligations, and is thus under the necessity of maintaining the semblance of an agricultural college. But what is the literal condition of these institutions? So far from being thirty-seven working colleges of agriculture in the country, there are but six that have ever filled the positions allotted them. These are the facts. Let us seek the cause, and through it venture to suggest a remedy. How are the thirty-one missing colleges to be accounted for? Where are the institutions which have so palpably failed in fulfilling the duties of their existence, by furnishing the coming farmer, the bulwark of the nation, with the education best fitted to qualify him for his true position n society and in history? Their absence is, I think, to be accounted for through two reasons. First: The times were not fully prepared for the innovation thrust upon them, and thus the institutions not only failed of adequate support, but we were utterly lacking in experience, and the proper men, either for instruction or management, in these untried fields were few indeed. Though the gentlemen called upon to assume control of our agricultural colleges have generally had the highest success of the undertaking at heart, and have labored assiduously and sincerely, they have not only been surrounded by unbelief, but darkness and uncertainty accompanied their every effort, and encumbered their every step.

What wonder then, that the college of agriculture in many a State is yet in its infancy, that growth has been exceeding slow? But the growth that is slow may still be vigorous, and the institutions now silent, are many of them on the sure road to success, and will, ere long, be heard from by the older and better known colleges of the land.

The other reason is also one of prejudice, but of a different kind, having its exponent in the old classical college. It is true that many of the staunchest friends and ablest supporters of agricultural education have come from the ranks of the "college bred man," yet it is a fact beyond contradiction that the great influence of the classical college has been thrown, with what may prove despairing strength, against the new institution knocking for admission to American favor. This deleterious influence has been exerted in two ways: Either by direct, outspoken and manly, though narrow opposition, or in the no less frequent but more fatal and less honourable guise of friendship. As an illustration of the two modes of procedure, I have only to point to Harvard and to Dartmouth. The policy of one has been to strike that it might stun, the other has embraced that it might suffocate.

The young institutions entered upon the cultivation of ground peculiarly their own, they made no obeisance, and asked no assistance of their older sisters, but simply claimed as a right the privilege of sharing in the instruction of young men, without entering into competition with the already established colleges. And yet, with hardly an exception, they have been met with bitter and persistent enmity; though sometimes received with open arms by older institutions of learning, the arms have generally been like those of the poulpe, extended only that they might crush.

Among the friends of agricultural education, two opinions have prevailed concerning the establishment of colleges: First, that with their great advantages and facilities for instruction, the thoroughly established institutions might, if stimulated by national endowment, maintain distinct departments of agriculture which would be vastly superior to new institutions founded by this national aid, and having everything to build on this often slight foundation.

Of the thirty-seven States receiving "land grants," all but eight adopted the former course, and passsed their nationally received funds into the treasuries of old institutions, stipulating that the money so obtained should be used for the purpose of extending industrial education. What has been the result?

With a single exception, not one of the institutions whose coffers have been thus replenished, has ever been of the slightest direct agricultural advantage to the States trusting them so implicitly. And so far have they been from fulfilling their obligations, that many of them have given their entire influence toward suppressing instruction in branches they have promised to support. If, in spite of these discouragements, an intelligent farmer's son, yearning for an education in his chosen profession, applies for admission to the agricultural department of one of these institutions, every effort is made to dissuade him from his purpose, and induce him to tread the antiquated paths of classical learning. Not always is this influence silently exerted, for thrice within my own experience have the presidents of celebrated universities publicly endeavored to stop further legislative recognition of the farmer's college.

Let us turn for relief to the institutions founded distinctly for the purpose of imparting knowledge best fitted for an enlightened agriculture. Eight States possess such colleges, and what is their condition? All but one of them have accomplished great good for the agriculturists of their respective States. Six of them are still doing noble work in their chosen field, and are recognized as fixed and important members of America's institutions of learning. While two of them have not only accomplished much for the agriculture of our country, but have achieved world wide reputations, and made their impress on the scientific archives of our time. Aside from this, one of them has been chosen as the model for the pioneer agricultural college in the empire of the setting sun; and in his last public address, Agassiz proclaimed that a certain series of experiments carried on at this institution, from their great scientific importance and practical value to all agriculturalists, more than doubly repaid all the college had ever received from both State and Nation.

And still the fruits of neither of these institutions have yet received the light of a quarter of a century, and their greatest archievements have occured since the death of the great "Teacher."

From these facts one lesson is forced most prominently before our eyes, namely: That the success of our agricultural colleges imperatively demands their absolute disconnection from other educational institutions. For however reluctant we may be to admit the fact, the belief is forced upon us that the old régimé fears the growing strength of the new; and instead of recognizing that both are laboring for the same great cause, and working harmoniously side by side for their common enlightening, educating success, we are compelled to see that, contrary to the wishes of the agricultural colleges, antagonism exists between the classical and industrial institutions. Let, therefore, each separately and independently work out its destiny.

Having accounted for the lack of so many agricultural colleges, let us examine the condition of those really existing, and glean, if possible, facts which shall point to their more perfect development, the carrying out, in the most liberal degree, of the spirit in which they were founded. In fact, seek means for returning to the farm more educated, practical, professional farmers.

Without slighting other similar institutions, it is simply justice to state that among the land-grant colleges, those of Massachusetts, Michigan, and Iowa stand preëminent for the good they have accomplished, and the strictness with which they have complied with the requirements of their foundation. They will, therefore, form the standard in our search for light.

What is the cause of the cry that our agricultural colleges have failed in a part of their duty, and do not induce their graduates to adopt the profession of farming? It is an established fact, that of the graduates of the three mentioned institutions, forty per cent. are already engaged in agricultural pursuits, while ten per cent. of the remainder are occupied with such kindred vocations as agricultural journalism, veterinary, and the teaching of agriculture and sister sciences. So that fifty per cent. of their alumni are following out the intent of the founders of the institutions. More than this, it must be remembered that hundreds of young men have attended these colleges, for longer or shorter periods, for the purpose of pursuing special studies; of these, ninety per cent. are engaged in agriculture as their life calling.

Favorable as is this showing, both our regard for the happiness and success of these graduates, and our belief in the great good it is within their power to accomplish for American agriculture, lead us to devise, if possible, some means by which more of them may be both "induced and prepared to pursue the practice of their calling, upon graduation," and accept for life the profession of agriculture: "The most useful, most healthful, and most noble occupation of man."

We must now treat of the agricultural college as a unit. The American agricultural college, on the whole, has most palpably failed in the discharge of its trust, and has returned to the farm far too small a part of its alumni. Let us account for the fact, the remedy will be self-suggested. We must remember that most of the graduates with whom we are dealing, are young men who have invested their all in an education which they are determined to turn to the best account. Not owning farms of their own, and unwilling to go into debt for that which they lack the pecuniary means to properly conduct, for they know that capital in farming is as essential as in any other business, they are fain to accept the position in which their services command the highest reward. If this chance to be the management of an estate belonging to an older and richer farmer, it is accepted with joy; if presented in more advantageous form elsewhere, like an intelligent man, our graduate accepts it, that the day on which his eye is continually fixed may hasten its approach.

With these men we have little to do; they have adopted a course dictated by education, reason, and prudence. To them I simply say, agriculture must be regarded like all other business pursuits, and if your knowledge, experience, and confidence in yourself are such that you have the courage to embark in any vocation without a cash capital, then, and only then may you enter upon your chosen profession without personal means for its conduction. But there exists another class of young men, either the sons of farmers, or possessing the means to engage in business for themselves, who, if the instruction imparted to them at our agricultural colleges was of the right kind, would not only be prepared, but induced to become successful leading agriculturists. This class it is with which we have particularly to deal.

How shall these students of agriculture be best fitted for the calling to which we destine them? First, *agriculture* must be recognized as the prime object for which *colleges of agriculture* were instituted, and the governing principle in their management. In their courses of instruction, its theory and practice must receive first place. Not only this, but all science, all art, and all culture must be taught in their direct relations with the "art of art, without which man is a savage, and the earth a wilderness."

This end can only be achieved through suitable managers and instructors. A board of merchants and lawyers can no more successfully conduct the affairs of an agricultural college than the executive committee of an agricultural society can properly examine candidates for admission to the bar; and it is utterly impossible for a theological president and a medical professor of agriculture to qualify young men for successful farmers.

Farmers! that so many young men are not better fitted for the profession in which they are supposed to have been educated, is largely your fault. So long as you delegate the control of your institutions to the hands of men having little at stake, and to whom agriculture is of minor importance, you must not complain that the institutions fail to make farmers.

Cease grumbling at the present state of affairs, assert your rights, assume the control of your own colleges, and manage them in the interests of advanced agriculture.

The plan I propose is no visionary one, unity of action will carry it to successful completion. The tillers of the soil compose a majority of the voters of the nation, and in many States three fourths of the citizens are engaged in agriculture. When farmers are represented by farmers in the halls of legislation, then, and only then, will our rights be fully recognized.

But, meanwhile, is there not a method by which many of the evils of our educational system may be removed? I believe the intentions of the managers of our agricultural colleges are generally good, but they lack experience, and above all, a knowledge of the means by which the highest success of their *protégés* can be best secured. And when we recollect that, in addition to these facts, they have little personal interest in the undertaking, is it to be wondered at, that ground for complaint exists?

Who generally are the instructors in our colleges of agriculture, and by what means are they supposed to be striving to qualify young men to successfully till the soil? As the twig is bent the tree inclines.—In what manner are the energies of our agricultural students being moulded.

It is not only by the teachings, but by the example of instructors that minds can be directed toward the desired goal, and yet the Faculties of our agricultural colleges are too frequently composed of men who have no direct interest in agriculture. As a natural result the institutions are agricultural only in name; and the chair of agriculture, if it exists, is often occupied by a man both ignorant of the art he pretends to teach and regardless of the consequences of such a fact.

If the presidents and professors of agriculture in these institutions were only ignorant of the practice of the science, but were correct scientists, and interested heart and hand in the higher agriculture of which they should be the exponents, the picture would possess a far brighter coloring, for between science and practice there can be no real antagonism. What is theooetically true, must be practically true. If instruction in both the theory and practice of agriculture can not be embodied in one man, it certainly can be no impossibility to secure different men to treat each branch of the industry.

Persons connected with these institutions are too prone to follow the example of wily politicians, and court favor of the farmer by extolling the pleasures of country life, and expatiating on the dignity of labor. To these I would say: No student can by such means be induced to accept agriculture for a vocation. If you really have the good of agriculture and the welfare of your pupils at heart, forget not that the force of example is far more potent than eloquent laudations; therefore, take off your coats, throw aside your gloves, and go to work.

Concerning the respect of our men of letters for the grand calling in which God placed the first created man, our boasted civilization is a failure. Well might we learn a lesson from the so-called dark ages.

During the feudal period, all literature and all civilization was possessed by the monks, by whom learning was preserved. They were not only arduous laborers themselves, but strove by precept and deed, to inspire rural people with a love for agriculture. Knowing that it must support all other industries, they worked for its advancement with untiring zeal, applying to it their knowledge of science, and aiding the laborers in mastering the principles which govern the art. They exerted all their powerful influence towards placing agricultural labor in the position which its importance demands, and the highest dignitaries of the church labored in the fields. When men, filled with admiration for some illustrious saint, made pilgrimages to his abode, and found him clothed in the garb of a laborer, working with, and superintending the efforts of the farmers, they could hardly fail to return with an increased sense of the dignity of labor, the importance and honor of agriculture.

To-day the agricultural colleges are the fanes toward which the eyes of anxious laborers are turned. If the farmer-pilgrims who visit them for new ideas concerning their art, find that the men in whom the weal or woe of the institution rest are of themselves, and engaged with both brain and hand in seeking their welfare, who can foretell the good sure to accrue from the certain increase of confidence. And if the young men flocking to these institutions find that the professors, though scientists, are farmers as well, many of them will surely recognize the independence, pleasures, and nobility of agriculture, and choose it as their life's vocation.

Can either the curriculums or methods of instruction in these colleges be improved, so that they may more fully carry out the views of their founders? Theoretically, the course of study laid down in the best of these institutions is correct. On paper it offers little opportunity for improvement; but in practice, it is sometimes sadly lacking, inasmuch as it is not carried out.

Many persons labor under the belief that agriculture, and its most intimately connected sciences, are all that rightfully have place in the course of study at an agricultural college. Such is far from being true; the object of these institutions is not to send out from their halls agricultural *machines*, the demand of the times is for educated, *thinking* farmers.

The coming farmer needs a broad culture that he may successfully cope with the exigencies of the times. The first object of the agricultural college is not to make *farmers*, but to make *men*—useful citizens—and then to use all their influence to induce these men to enter upon the pursuit of agriculture. The man makes the calling, not the calling the man, and the instruction imparted by the college of agriculture should not only enable its graduates to become successful farmers, but should prepare them to fill most creditably the positions which the importance of their vocation makes rightfully theirs, and confer the most honor on their country and profession.

Objections are sometimes made to the law which compels instruction in the art of war in these nationally endowed colleges. The owners of the soil have always been its staunchest defenders, and equally true is it that the institution of learning for America, is that where our young men are taught the arts of feeding themselves and of defending themselves.

Every effort should be made to inspire students with a love for rural pursuits, and their connection with the soil should be made as intimate as possible. As well can anatomy be taught without dissection, as agriculture without land. And on this land the students should be made to perform all the various farming operations, and in each department instruction should be given by an expert, qualified to explain procedures, and the reasons therefor. Above all things, students should not receive pay for their labor; it should form one of the regular departments of instruction, be presided over by a professor, and rank with any part of the curriculum. This exercise should supplant in no way other branches of education, but it should be made in every respect the equal of any. If, in addition to their prescribed mental and physical labor, the students have time to devote to extra work on the farm, for which they must receive pay, all the better for them, for the institution, and for the cause of advanced agriculture.

The opinion has been broached, and has many able adherents, that tuition in these State colleges should be absolutely free. There is no doubt, that the adoption of such a course would greatly increase the number of students; but I am fully convinced that their character is not improved by this means. The tuition should not be high, but should exist for the purpose of inspiring students with the belief that their education is worth paying for. A young man worthy of receiving instruction, will find some means for defraying the expenses of a slight tuition; and he will then realize that the instruction imparted to him has a money value, and will be loth to neglect any opportunity for increasing his store. If the effort compels self denial, the lesson will be brought to mind with all the more force.

If possible, many free scholarships should exist, to be awarded to successful competitors; the holders will then have won them by their own exertions, and the privileges they confer will be doubly valued. If a part of these prizes were offered only to such students as choose the profession of farming, it would serve the double purpose of increasing the number of graduate-farmers, and tend to create farmers of the smartest students.

Agricultural societies could in no way so advance the interests of agriculture as by founding such scholarships, that is, by annually paying the tuition of successful competitors.

The beneficial influence of such a course would be almost incredible, by stimulating sympathy between farmers and students, making more apparent the fact that their interests are one. The result would be to send out from these colleges scores of young men every year, to take their place among the intelligent, educated, working farmers of the land. In comparison, the expense to the societies would be insignificant, indeed.

Now let us turn from our consideration of the internal management of these colleges, and glance at a few outside influences which might be so modified as to affect the cause.

A large part of the graduates of these institutions, who turn their faces from the farm, are country boys who have farms to return to. What then accounts for their flight? Farmers! is not the blame largely yours? Cease to decry the calling in which you are engaged; though discouragements arise, remember that they traverse all paths of life, and that nowhere are they so few or so certain to quickly vanish as on the farm.

Though the rewards of your labor are not always large, they are infinately more sure than those obtained in other occupations; and your lives contain many pleasures and blessings gold will not buy. When conducted upon the same business principles governing other pursuits, the profits are vastly superior to those obtained elsewhere, for aside from the pecuniary return, forget not the freedom, independence, and immunities of country life.

Therefore so guide your actions that your student-sons may retain only pleasant memories of their boyhood's life on the farm. Then surely they will return to the old homestead, the stay of your latter years, and there devote themselves to the principles instilled by their college training and to the demands of a higher agriculture.

The agricultural colleges of America were created for American farmers. In spirit they are yours. Make them so in fact. Stand not aloof. It lies within your power to make them the instruments of untold blessings to the country we love, or apathy on your part, will extinguish the light just beginning to penetrate the darkness of unbelief.

Though the furrows turned in the field of agricultural education have often been narrow and crooked, the virgin soil has already borne much good fruit. Lay your hands to the plow, farmers, and guide the future course of your most powerful instrument of cultivation—the emblem and exponent of agricultural advancement—the American agricultural college.

For the trustees of these institutions I have a word of advice. That yours is a difficult and often thankless task, I know full well. You labor under the disadvantage of those engaged in undertakings slightly in advance of their times. You are endeavoring to harmoniously unite in one institution, a college and a professional school. Let not the latter suffer to the undue advantage of the former. The institutions are not only colleges, but *agricultural* colleges, though the course of instruction must furnish culture and education for the future able citizen, see to it that the studies of the future farmers are not cramped thereby. Guard against an elementary tendency, elevate the standard of instruction in your colleges so that they may receive, to these halls, men rather than boys.

Then will their graduates enter upon the practice of the profession in which they have been educated, giving it the broad culture of their college training, and striving for the advancement of American husbandry.

Then, will the college of agriculture enter upon a brilliant career of usefulness, and the art of tillage receive a new impetus, the light from which will shed fresh luster upon our country.

I have now treated of what present themselves to my mind as the most effective methods for preparing and inducing the graduates of our agricultural colleges to embrace the profession of agriculture. And I believe that no visionary means have been suggested, but only such practical methods as have been brought forcibly to my attention by experience with these institutions.

If my effort shall serve to create one new friend for the cause of agricultural education, or shall turn toward the farm one face fixed on an other calling, my labor will not have been in vain.

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REPORT

OF THE

PENNSYLVANIA STATE DAIRYMEN'S ASSOCIATION.

1879.

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President,
J. H. LENHART, Meadville.

Recording Secretary,
H. COOLEY GREEN, Meadville.

Corresponding Secretary,
J. M. BIGGER, Meadville.

Treasurer,
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H. COOLEY GREENE,	S. A. FARRINGTON,
J. M. BIGGER,	Hon. S. H. FINDLEY.
Hon. S. B. DICK,	

The season of 1879 has been a remarkable one for the dairy interest. Opening at the darkest time of industrial depression, the products of the early season found an extremely dull and discouraged market.

As the season advanced the situation manifested no signs of material improvement, till it became evident to all that the make for the season would be far short of that of former seasons.

Then prices began to advance, and we beheld the remarkable spectacle of cheese doubling its value in less than thirty days.

Fortunately the profits resulting from this unprecedented advance have been pretty evenly distributed between producers and dealers.

The movement was so rapid that buyers had not faith enough in its permanency to purchase very extensively, and as prices moved steadily upward the producer received his share of the benefits.

The very flattering condition of the markets now, near the close of the season, is an omen of good for the future, and the clouds of gloom that have for so long overspread the path of the dairyman are lifted.

The future has its promises of reward; the past its warnings for all connected with this great industry.

To those who have turned their energies in the direction of improvements in the quality of stock, in quality of products, and in methods of conducting their business, there is ample promise that their efforts shall not be in vain.

It is through this class of intelligent, progressive dairymen that this Association aims and expects to reach and improve the masses.

Intelligence, industry, enterprise, and thrift are stronger than ignorance, slothfulness, stupidity, and "do-less-ness," and will surely lift them up to a higher plane of activity, and while it is not possible to reach a certain class of dairymen directly, it is possible to set influences at work around them that they cannot resist, and that will force them out of the ruts and into the better ways of life.

This is the aim and hope of this association in all its labors, first to hold out the light and render assistance to those who seek the light and to know more of the calling in which they are engaged, to stimulate them to higher aims and aspirations, and lead them to more satisfactory rewards for their labors.

With this purpose, the following report is presented for the perusal and consideration of progressive dairymen.

REPORT.

COMMERCIAL ASPECTS OF THE DAIRY.

By President Fuller.

Mr. President, Ladies, and Gentlemen: At no time in the history of the dairy business has it seemed so imperative that we should carefully and thoughtfully discuss the present condition and future prospects of the industry.

We have recently experienced an unprofitable season, unprofitable, however, only in comparison with the usual prosperity which has attended the dairy interest since its introduction into this section. In comparison with other farm industries, it presents no discouraging features, and when we consider the shiftless, crude management which characterizes it at the present time, it is a matter of surprise that it should make so favorable a showing.

It will be my purpose to prove that the only way by which we can render it beyond per-adventure the most profitable branch of farming that can occupy the attention of northwestern Pennsylvania, will be by the adoption of better methods, and the acknowledgment of the fact that the business is to be permanent in its character.

"Times change," and to keep up with the time is an every-day expression. This common-place remark applies very appropriately to the dairy business.

The time was when inferior, poorly made cheese commanded a fair price in the market. This had a tendency to foster a spirit of carelssness upon the part of dairymen.

But little progress has been made in the past few years. More blame attaches, however, to the factory than to the patron. Reform must first begin at the factory, and gradually extend its influence over the entire patronage it controls.

In brief, the business up to the present time has been conducted more as an experiment than as a fixed fact. Many of our factories are illy adapted to the purpose of successful cheese-making, being poorly constructed, provided, in most cases, with inadequate drainage, and possessing neither good curing rooms nor, in any case that has come under my observation, cellar storage room. In the management of the factory, sufficient attention has not been given to the receiving of milk, excepting only that from which the best results can be secured, and manufacturing in grade and quality that class of cheese which will best meet the requirements of the trade.

On the part of the patron, little attention has been given to the selection, care, and feed of the dairy stock, and in many cases but slight regard for the proper care of milk at the dairy. Such care alone can insure success upon the part of the manufacturer. It is safe to assert that at least one half of the dairy stock of this section is not of such a class as to afford any profit to the patron, even with cheese at better prices than we have realized the past season. The necessity of better care of milk at the dairy is of the utmost importance, when we consider that the neglect of one patron in this respect is sufficient to ruin the entire product of the factory.

It is necessary to inaugurate a more thorough system in the business, if we are to render it a source of greater profit. We must place the matter in its proper light, endeavor to arouse dairymen to a sense of the difficulties which surround them, and suggest, if possible, the best means of overcoming them.

Dairymen are constantly inquiring, will it be profitable for us to continue in the business? I reply, not as long as you treat it merely as an experiment.

I do not feel competent to point out a remedy for all the ills which at present beset the business, or to suggest the best means of overcoming them. I merely present, in the form of propositions, the reforms which have been indicated as necessary in order to render the business substantial, profitable, and something more than a mere experiment, and, without any attempt at discussing them, I yet trust they will furnish material from which to gather a better understanding of the wants and requirements of the business.

First. Our factories should be remodeled, provided with proper drainage, better curing means, and, where practicable, supplied with cellar storage.

Second. Strict regulations should be adopted and enforced in regard to the receiving of milk, and the factory man upheld in declining to receive milk that is not in a proper condition from which to secure the best results.

Third. Manufacturers should study more carefully the requirements of the market. If your stock is intended for the foreign market, or for the home market, whichever it may be, endeavor, if possible, to suit the requirements of the market for which it is made.

Fourth. Patrons should give the attention required to the proper selection, care, and feed of their stock.

Fifth. In view of adopting the business permanently, rather than as an experiment, the farm buildings should be changed so as to best subserve the purpose, and the entire farm management should gradually be shaped so as to meet all the requirements of a dairy farm. The business in all its departments should be changed so as to fully meet the necessities of the case. Factorymen and dairymen should unite in the effort to place it upon a sound and enduring basis, accepting the business as a permanent one, and seek to render both factory and farm worthy of the purposes to which they are devoted. Not until this is accomplished can we expect to secure returns that will be satisfactory, and give to the business that stability which is necessary to its future prosperity.

Organization.

In this connection, the subject of organization may be most appropriately considered. I have endeavored to show you that stability and the adoption of better methods in the business are urgently required. In accomplishing the reforms indicated as necessary, a more complete organization is called for upon the part of the interest. I may truly say that organization, so far as it concerns the interest at large, has been very fully accomplished in this section, resulting in the possession of a reputation upon the part of Pennsylvania for the manufacture of fine cheese, that is not only creditable, but of great pecuniary benefit to us. This association is known and generally recognized as one of the most enterprising societies in this country, and our Board of Trade is referred to as a "model cheese Board of Trade." Assuming, then, that our organization in this respect is very complete, it occurs to me that the foundation should next receive attention, otherwise the superstructure may prove but a glittering show, and for lack of firm support eventually come to grief. My proposition is this: Better organization at the factory.

I believe by a better organization at the factory much good may be done, and a rapid advance in the business be made. Under the present system, each factory holds a meeting at the opening of the season for the election of officers, and to arrange the contract with the manufacturer for the ensuing year. This, to the average patron, seems to be all that is necessary. He commences delivering milk at the factory, and to the end of the season inquires not, except for his dividend, apparently taking no special interest in the management or success of the factory; whereas, by adopting a different course, based upon organization, he might be able to learn very much that would prove of value to him in the management of his business.

The valuable hints and suggestions that would spring from a thorough organization upon the part of every factory would have its influence for good upon all its patrons. In the hope that this suggestion may be adopted and tried by some of our more enterprising factories, I append an order of business, if it may be so termed, for the carrying out of such a plan of organization:

A full attendance of patrons should be secured at the spring meeting.

Order of business: Election of a president and secretary *pro tem.*

1st. Election of a president for the year.

Election of a salesman. Experience has proven that one competent man as salesman is preferable to any other plan.

Election of secretary and treasurer.

Contract with the manufacturer.

Resolved, That the patrons of this factory will meet on the last Saturday afternoon in each month during the season. That the president be instructed to present subjects for discussion, and also bring before the meeting any matters of importance affecting the interest of the factory or the patrons. That the secretary is requested to provide small printed notices of the meeting, to be sent out on the milk routes the day preceding each meeting.

This plan will call for six meetings only during the season. The subjects that may be discussed at these meetings are multitudious. A few are as follows: How can the quality of milk be improved? Shall we adopt Professor Arnold's method of can ventilation? Shall we instruct our manufacturer to exclude all milk from the vat that is not in a proper condition from which to secure good results? Is the curing-room of the factory properly constructed? If not, how can the difficulty best be remedied? Reports from the manufacturer of the amount of milk received per cow from each patron, in order to ascertain the cause of the better results obtained by some dairies, owing to special feeding or other causes. Shrinkage in the flow of milk during the dry season, and how can it be prevented? Selection of stock, soiling and its advantages, and many other questions, the discussion of which, if participated in by only a few patrons of each factory, must eventually produce good results in every factory.

The necessity of notifying the patrons of the meeting on the day preceding each meeting, is obvious to any one who has had experience in like organizations, and is necessary in order to secure a good attendance. An invitation should be extended to the ladies as well.

I feel an apology is due for occupying your time with so much detail, but having great confidence in the efficacy of such a plan, and the advantages that must result from its adoption, I am led to hope the effort will not be altogether in vain.

Marketing of Cheese.

I have been requested to discuss at this time the subject of marketing cheese. I appreciate the importance of the subject and my inability to discuss it satisfactorily.

The best method for the marketing of cheese is a subject which, above all others, at the present time, claims the earnest attention of every salesman, proves the bone of contention in almost every factory, and is perhaps as little understood by dairymen as anything connected with the business. The question is, what course shall we adopt in the selling of cheese, and what is the tendency of the trade at the present time? An appreciation of the fact that times have changed in respect to the manner of handling, as well as in the manufacture of cheese is necessary to a correct understanding of the subject.

Before entering into a consideration of the plans that are feasible, and those that are not, it might be well to refer to early methods and study some what the changes that have occurred in the manner of handling cheese at different periods. We find that in the early history of the cheese trade, before the inauguration of the associated system of dairying, the trade was conducted largely upon a credit basis.

The experience of that old pioneer in the cheese business, Mr. Harry Burrell, of Little Falls, New York, whose transactions in cheese have extended over a period of forty years or more, furnish the best illustration.

In central New York, during the early times when cheese was made exclusively upon the private dairy system, Mr. Burrell was the medium of disposing of a large portion of it. The entire season's make of certain dairies was placed in his hands for disposal, subject to a settlement on the 1st of January of each year.

At a later period, when the business had assumed still larger proportions, settlements were made more frequently than once a year, and still later we find it being conducted upon an almost strictly commission plan, returns being made when sales were effected.

In the year 1855, the factory system of cheese making came into vogue, resulting in a very short time in a largely increased production of cheese. A fair export trade had already been established, and was increasing yearly in extent and importance. The prevailing method of handling cheese at this period, and until the opening of the war, seems to have been very largely upon the commission plan.

With the opening of the war, and the abundance of funds such as the trade had never before experienced, we find that the business, in common with almost every other branch of trade, gradually drifted to a cash basis, and until within the past few years, which will include the entire period that has witnessed its establishment and growth in this section, the business has been transacted in this manner. We must again be reminded, however, that times have changed, and that what has been is no criterion by which to judge of the future. I am reluctant to argue in favor of consigning goods in preference to the plan which obtained in this section ever since the introduction of the cheese business, but I cannot be blind to existing facts and the changes which have occurred in the business during the last few years.

I will endeavor to point out, so far as I may be able, the cause of this change, and prepare you, if possible, for an acceptance of the present changed condition of affairs.

1. The increased production of cheese—I might say the over production of cheese, especially during the past season, and the gradual decline in values, has rendered it extremely hazardous, if not almost impracticable, for buyers to make extensive purchases during a considerable portion of the season.

2. The depreciation in values has caused the salesman to demand invariably a greater price than it is safe for the buyer to pay.

3. The limited amount of capital engaged in the business renders it impossible for dealers to purchase, and pay at sight, for any great portion of the goods offered.

4. The stringency of the times, the uncertainty as to the future, the conservative feeling upon the part of the trade, and the knowledge that goods must go forward, have all tended to render the business, as it will probably continue to be, almost a strictly commission business.

To revert to my first proposition, the increased production of cheese and the decline in values.

When the supply exceeds the demand, or when an article is depressed in price, there is, generally speaking, little speculation in it. Again, the high prices which have ruled in the cheese market during the past few years, have produced in the minds of manufacturers false ideas, and it tends to drive salesmen and buyers far apart.

Lastly, from the best information I can gather, the cash capital of the New York commission houses, exclusive of the exporters and the dealers who do not make the handling of cheese a specialty, does not exceed $600,000. These houses dispose of annually upwards of $12,000,000 worth of cheese, together with a limited amount of butter and general produce. The receipts during one week of the past season were one hundred and forty thousand boxes of cheese, in value almost equal to the cash capital in the business. It will readily be seen that so vast a business cannot be conducted upon a strictly cash basis. It frequently occurs that a house with $20,000 cash capital will carry $100,000 worth of goods; this is done by hypothecating the goods, or, in other words, giving storage receipts as collateral for money borrowed.

To purchase in the country for cash all the cheese offered for sale under present circumstances is simply impossible, and this last statement, in connection with the causes already given, must convince every salesman that the difficulties in the way of cash sales are very great.

In view of the fact that the commissioning of goods is evidently the method that will prevail in the near future, the question which presents itself is this: Under the new aspect of affairs, what method shall we adopt in the sale of our cheese? The difficulties under which we labor are many, the principal obstacle in the way of cash purchases in this section being our distance from the seaboard, and the risk and uncertainty of transportation. The buyer is not willing to assume the risk, and the salesman is unwilling to make the allowance necessary to cover the risk. Hence, in this respect, we are not upon an equal footing with the dairymen of central New York, where the risk of transportation is reduced to the minimum, rendering cash purchases in that section comparatively safe.

I will proceed to discuss the only plan that has been offered by our salesmen for the handling of the cheese of this section, and I regret that I cannot indorse it as feasible. I consider it proper that this matter should claim our attention at this time.

It is proposed that we establish a house in New York, to be managed by an agent appointed by us, for the handling of all our cheese. At first sight, this plan would seem practicable; but when it is carefully considered we find that it is not. In the first place, it is not possible to unite any large number of factories in the choice of an agent. The position requires a man having more virtues than are generally combined in any one man.

Secondly, many would claim that it was placing too much power and responsibility in the hands of one man. Again, it is a well known fact in trade that a purchaser generally buys his friends. The establishment of such a house would immediately draw upon it the opposition of all the established dealers, and the exporters, few in numbers, would scarcely be expected to feel warranted in filling their orders at a house of which no one would speak well, and whose permanency was so questionable. It seems scarcely necessary to discuss this plan further. It, however, suggests a plan which might meet with success, provided there was thorough coöperation upon the part of the factories interested.

Suppose forty or more factories unite in sending a representative, not an agent, to New York. The former signifies mere representation, the latter control of the property. Enter into a contract with two or perhaps three responsible houses, to handle your property, said arrangement to be binding upon you only so long as you are satisfied that the parties are serving you faithfully. The rate of commission, in view of the amount of your goods controlled by these houses, should be secured at a reduced rate, and the present rate that you pay in consigning your goods promiscuously, should defray the expenses of your representative. In case a factory should withdraw from the arrangement effected with these houses, the services of the representative could be made as valuable in the supervision of the property wherever it might be sent, and perhaps at little more expense to the shipper.

The duties of your representative would be as follows: To examine the goods upon their arrival, noting to whom consigned, their condition and weights, and ascertain when sold; to advise parties at home of the market, condition of consignments, time of sale, and any change which might occur in the responsibility of the houses to which consigned, and if a man of good judgment, he should be able to present valuable suggestions from time to time.

The advantages of such a plan are these: Greater security will be guaranteed. It requires no expert in cheese, the houses alone being responsible for the proper handling of the goods. Consignments, owing to the supervision of your representative, will receive the best attention of the houses to which consigned.

I present this plan merely as a substitute for the one which has already occupied your attention. All plans of this kind require thorough coöperation, and though we have no precedent from which to judge of the success of such a project, yet I am led to believe that dairy sections, situated as we are, can profitably consider this matter.

In view of the present condition of the cheese trade and the probability that no change will occur in the manner of handling cheese in this section, it is fitting that we should consider what is the best method for us to adopt. I would suggest a thorough uniting upon the part of salesmen in support of the board of trade. I know that many patrons are averse to this, and merely from the fact that they do not fully understand the matter. The advantages of sustaining the board of trade are these: It affords greater security, it enables salesmen to learn something in regard to the houses with whom they are dealing. Through it they are able to learn whether their cheese has been sold at its market value, and it affords them a strong arm for defense in case of the failure upon the part of the dealer to fulfill his contract. I cannot conceive how the interest can afford to forego the benefits to be derived from an association upheld for the purpose of mutual protection. The valuable influence of the board of trade upon the manufacture of cheese, and the price obtained for it, cannot be overrated. It has tended to render it more uniform in quality and of a much higher grade than could have been attained by isolated effort, and has secured better prices than would otherwise have been received. Persons who are not well informed, or who have been misled by specious arguments, argue that the board of trade is the cause of the change in the attitude of the buyers, and that a combination has been formed, which prevents the sale of goods on the home market. The arguments already advanced in the discussion of the present tendency of the trade, fully refute this assertion, and must suffice to explain the changed condition of affairs, which alone can be chargeable with the change in the manner of handling cheese. There is another point which should claim the attention of salesmen, in relation to the selling of cheese, and I believe it to be of the utmost importance, and the only successful mode of handling the product; and that is, always sell your cheese or move it, when it is in the best condition for market. I trust, in future, that this will be the motto of every salesman.

It only remains to discuss briefly the future outlook of the dairy business. I see nothing to cause discouragement. The adoption of better methods in the business, and the determination to manage it no longer as though it were a mere experiment, is all that is necessary. Every business has its periods of depression, and all branches of business at the present time are greatly depressed, not only in this country but in Europe. I do not argue that all farmers should become dairymen, but I do insist that it is the heighth of folly for those who are at present engaged in the business to desert it. Cheese will undoubtedly command only a fair price next season. It will be governed somewhat by the price of other staple articles of food, and the condition of the laboring classes of England. As between cheese and butter, I believe that next season will show a decreased production of the former, and an increased production of butter. Taking all these things into consideration, I believe the cheese business will be more satisfactory next season than it has been for the past year. The close discrimination in the quality of cheese, which has characterized the trade for the past two years, will not diminish, and a strict adherence to the manufacture of full milk stock, and that of the very best quality, is necessary. The adoption of the creamery system to any extent in this section would undoubtedly prove ruinous, from the fact that the milk which is withheld from the factories must go to increase the amount of butter made.

There is another matter relating to the future prosperity of the dairy interest in this section, which is deserving of mention, viz: The rate for manufacturing to be adopted the coming season. The unprofitableness of the business the past season will tend to render patrons more exacting in their demands for low rates. It should be remembered, however, that it is the employer and not the employed who almost invariably assumes the risk of business. "The laborer is worthy of his hire," and a satisfactory and reasonable compensation is not only just but the best guarantee for the future prosperity of the business. Poorly paid labor generally results in the production of a poorer class of goods, and in the end is loss and not gain to the employer.

In closing, I would invite your attention to the work which has been accomplished by this organization during the past year. Under its auspices has been held a very successful course of lectures by Prof. L. B. Arnold. It has been thought advisable by your executiveto collect the more valuable suggestions contained in these lectures, and to publish them in pamphlet form. A sufficient number to supply the patrons of every factory in the district has been secured, and it is hoped that factorymen will attend to their careful distribution.

The successful exhibition of our dairy products undertaken by the Association and Board of Trade at the International Dairy Fair in New York, and which received the favorable comments of the press and the approval of the trade, should be a cause of congratulation to the interest.

We are also the recipients of a generous and timely appropriation from our State authorities, which has provided largely for the present and further wants of the association.

I would again urge upon all the necessity of hearty coöperation in the support of this organization, which has accomplished so much for the dairy interest of this section. By this means alone can you attain the greatest success and retain for this section that prominence and reputation which we have already gained.

In presenting you with this, my last annual address, let me assure you that I shall ever retain in pleasant recollection the frequent gatherings in which so many of us have participated, and that in the future, as in the past, I shall ever stand ready to serve the interest to the best of my ability.

SECRETARY'S REPORT.

By H. Cooley Greene.

Mr. President and Gentlemen of the Convention :

Your Secretary desires to express his grateful remembrance of the uniform confidence and numerous marks of courtesy he has received at your hands.

The office of Secretary of a live institution like the Pennsylvania State Dairymen's Association is not a sinecure. While its duties have not been onerous, there has been work to do, and work of a character that calls for the best one has to give. The present incumbent has had but little of value to give, but he has tried to serve the interests of the Association according to his ability. However poorly his work may have been done, he feels that it has been generally received with kind consideration, rather than exacting criticism. I have not been insensible to my lack of qualifications for compiling in a creditable manner the transactions of your Association for the annual reports. The severest censure I am sensible of lies in the fact that so large a portion of my reports for 1877 still remain unused and unread in the office of our worthy President. I try to bear this mortification as meekly as possible.

Every year brings its special labors for your Executive Committee. An organization that would thrive must not go to sleep in harvest time. Your committee has not been content to follow precedents, but has devised plans involving a considerable outlay of time and money in order to keep the ball of progress rolling, and have seemed to feel great freedom in planning work for the Secretary. While other associations are content with one meeting a year, we have usually held three. This year the course of Professor Arnold's lectures has stood in lieu of the third meeting. I believe no other similar organization has been so effective in distributing information among its members. The fertile brain of your retiring President has brought forth numerous suggestions and projects, and if they seemed feasible and demanded by the interest, an empty treasury has been no bar to their accomplishment. Of all the problems we have been called upon to solve, in former days, the knottiest was that of procuring funds for carrying on the necessary work of the Association. We thought we had a right to expect that private dairymen, who receive the greatest benefits from the organization, would support it liberally and keep it in funds, but we long since learned that we must apply the brakes and retrench, which means stand still or go backward, or look in other directions for the means of replenishing the treasury. Happily the Legislature has seen fit to supplement our resources, and solve the problem for us in a manner most acceptable, by an annual appropriation. The Legislature does not, however, undertake to discharge the obligations of members to sustain an organization that is doing so much for them.

On the other hand, it behooves us in every way to prove ourselves worthy the aid we receive, and render to the tax-paying public a full equivalent for this appropriation of the public funds.

It is the experience of most organizations of this kind that their earlier meetings are well attended, but soon the interest relaxes, meetings grow thin, the treasury, which is the heart of such organizations, becomes empty, and they languish into uselessness. When a society ceases to be useful, it ought to die, and when the Pennsylvania State Dairymen's Association shall have done its work, and can no longer serve the dairy interest, let it die; but forbid that it should die a lingering death. If, like a bedraggled chicken, it should be stricken with general debility, and possess only strength enough to utter its plaintive death-peep, may some stoga heel come to the rescue and mercifully close its career.

To-day, however, we see no indications of disease. The counsels of the Executive Committee have remained harmonious, and the pulse indicates a healthful condition.

The series of lectures and instructions by Prof. Arnold, conducted in June and July, under the auspices of the association, was one of the notable enterprises of the year, and one that in its apparent, and especially in its possible results, proved particularly gratifying to its projectors.

This enterprise secured the personal visitation of the Professor at some thirty factories, involving an expense of not far from $300, and in most cases the patrons may say as did the fortunate church member, "It did not cost me a cent."

The project was undertaken in the belief that it would be fruitful of great good to thinking men, and therefore to the dairy interest; for the backbone of the dairy interest is its thinking men.

It did not surprise me that the practice of Prof. Arnold at the factories was not in all cases followed by results equal to his expectations. Neither he nor any other man should expect to know the character of milk deliverers at factories so completely that he will be able to produce a given result in texture and flavor with mechanical precision. The quality of milk is not strained always when it should be. By the aid of the imagination one may easily fancy his knowledge of particular samples of milk to be far more exact than it actually is, and there is no better way to take the starch out of one's self-conceit than to subject his supposed exact knowledge to the practical test.

It is therefore creditable to the faith of Prof. Arnold. in his powers of perception, that he consented to give repeated trials of his skill in actual practice, and creditable also to his skill that he succeeded so well in approximating the object aimed at.

As a matter of complete demonstration of the practicableness of his peculiar theory of rennet action *vs.* acid action, however, these experiments were not regarded as eminently successful.

It is doubtful whether he succeeded in convincing the majority of our cheese-makers of the practicability of substituting rennet action exclusively for acid action in all cases, while the inexorable demand of the markets is for a closer and firmer cheese than either he or his pupils have succeeded in making on the new plan in midsummer.

It would be a matter of regret if there were any disposition on this account to place the labors of Prof. Arnold at a discount. On the contrary, it should be evident to all that the information imparted and the hints dropped during those several weeks, where the pump of inquiry was in almost constant action, must produce favorable results, if properly sifted and rightly used.

If a teacher drop occasionally an injudicious remark, or claim undue honor for originality of ideas, or indiscreetly step aside from the right line of duty to assist one friend in his business at the expense of other friends, this should not operate against the validity of his legitimate teachings. It is an unusual fountain whose waters are always crystal and never turbid. So it is a remarkable teacher who always imparts truth unmixed with error.

The chief value of instruction consists in its tendency to excite inquiries in the mind and enable one to dig down to solid truth. It is not the amount or variety of food placed on our table, but that which is taken into the body and assimilated, that gives strength to the body. So the best instruction is not that which is poured out most freely, but that which is appropriated most judiciously, enabling us to perceive and reason upon the why and wherefore of things.

Every intelligent cheese-maker should have learned ere this that no theory, however well woven, is to be swallowed with the eyes shut. If there be one calling that requires of men more close discrimination than another, and extreme cautiousness in the adoption of new methods, it is that of the cheese-maker. Of all others, he should be last to give up the theories demonstrated by his every-day experience, and adopt new ones, however plausible, except by slow degrees and great watchfulness. At the same time, he should be no bigot, but an earnest inquirer after new and practical truths. In fact, when he ceases to inquire after new truths, he ceases to advance in his profession. I look to the future for the results that shall prove our cheese-makers and our patrons to be capable of modifying their practices in harmony with progressive ideas.

I have dwelt thus at length upon the new departure because I regard the enterprise as of transcendent importance to the dairy interest of this section, and worthy to be kept before the minds of all who are in any way connected with the industry. The hints and valuable ideas drawn out at the factories and over the vats are already recorded in the memories of the cheese-makers.

With a view of rendering more effective, such thoughts as are applicable especially to patrons and private dairymen, your Executive Committee ordered a synopsis of the course of lectures prepared and boiled down to the smallest space possible, and with a short treatise on "patrons organization," printed in pamphlet form. Two thousand copies of these pamphlets are now ready for presentation to dairymen.

Through individual and concerted efforts there was a very creditable display of cheese at the State fair, at Erie, mostly from this county, and exclusively by those who get their enthusiasm and enterprise stimulated by the labors of this Association.

The International Dairy Fair, at New York, the most important enterprise of its kind yet undertaken, was a complete success. To that success Pennsylvania contributed her full share—the only State that ventured to hoist before the world a banner, with the motto "Full Cream Cheese." Her display ranked equal in general appearance to that of any State, and drew forth exclamations of surprise from dealers and exporters, who marveled that such results should be attained in the newly developed section of north-western Pennsylvania.

For these undertakings, for the labors, risks, and sacrifices involved, for the placing of the worthiest products before the world as an advertisement of your skill, for the opening up of new outlets that must result from such advertisement, and for whatever profit or advantage may accrue to you as the outcome of all these, you are indebted to your two organizations—this Association and the Board of Trade. And now here is a feast of good things ready provided for your special entertainment. The best matured thoughts of men who are high authorities in their special departments are at your command. To this rich entertainment you are freely invited, but please let each individual remember, that these conventions and the enterprises above alluded to, cost something in money as well as in energy, and that cash in the treasury is the very life-blood of an efficient organization.

I have briefly reviewed the work of the year just past—1879 will bring its work, too, but what it may be does not yet appear.

This is certain, that while the Pennsylvania State Dairymen's Association remains a living body there must and shall be no step taken backward, neither can we stand still. We must move forward to new acheivements. To stop is to commence a retrograde movement, which we cannot afford to do. It would secure the advantage in the race to the West and other competing sections that are close upon us, and our sure defeat.

We have the soil, the climate, the crystal springs, the sweet grasses, and all the natural resources for a first-class dairy region, and it only requires intelligence, enterprise, industry, and integrity to the spirit of our motto, "Full Cream Cheese," to insure success.

FOOD AND CARE OF DAIRY STOCK.

By Hon. Harris Lewis, *of Frankfort, New York.*

When the genial influence of spring awakens again into life, from its long winter sleep, the grass of the fields, and unlocks the brooks and rills from their icy embrace, the cow, aided by instinct, reason, or memory, again looks forward to the day when she will be permitted to go forth into her favorite summer home, the pasture green, where she may obtain in abundance that food which the God of nature designed for her support.

I hope no one present will be offended if I say that instinct has done more for the dairy cow, in very many things, than reason has done for her average owner. Fearing that this may give offense, I will not say it, but will say, with your permission, that instinct has proved itself to be a safer guide for the cow than reason does, or has, for mankind. In proof of this position, allow me to call your attention to the general practice of dairymen in keeping their cows imprisoned in the barn and yard until, as they term it, "the pastures get a good start," or the cows can get a "full bite of grass."

The instinct of the cow tells her to "go to grass" when it first starts up in the spring, and could she speak with man's voice, as did Balaam's ass, would say to her owner "go to grass" with your nonsensical reasoning.

The safe rule for every dairyman to adopt in regard to turning out in the spring is, that as soon as the weather is suitable for the cows to be out, and the ground sufficiently dry and firm so as not to poach up by the tread of the cows, to open the gate and let the cows go on their way rejoicing.

But their food must be continued night and morning until they obtain a sufficient amount of grass, and no longer require the artificial food.

The health and comfort of the cow must be provided for, and she kept in the stable during the cold storms, night or day, until she will be more comfortable out of doors than in the stable.

The advantages secured by turning out thus early in the spring are these:

First. The change of food for the cow is made by a slow but gradual process, creating no radical change from day to day, but by an easy transition from dry winter food to grass with its summer succulence, without any derangement of the organs, and creating no shock to the milk-producing organs.

Second. Pastures turned into early, so that the cows will crop the grass starting first and continue to feed it off, more or less, during the entire season, allowing much less to obtain a rank growth, which always renders it undesirable as food for the dairy cow, will produce more good cattle food during the entire season than the same pasture turned into two weeks later.

We have all observed that a rank growth of pasture grass is not relished by the cow, and when turned into such grass will select certain spots for reasons known only to herself, which she will feed close to the ground, leaving large areas of as good looking grass to us undisturbed, to go to seed, and, finally, decay on the ground where it grew.

While no dairyman will estimate his ability to pasture stock through the season by the growth of grass during the month of June, still it cannot be considered good to allow large quantities to go to decay on his pasture year after year.

Those dairymen who will provide some good soiling crop, with which they can supply any lack of the pasture grasses to furnish their herds a full supply throughout the summer season, will obtain the best results. For this purpose, a piece of land, say one quarter acre for each cow kept, may be seeded with orchard grass, Kentucky blue grass, and medium clover, and, so long as the land is kept productive by top-dressing every fall with barn-yard manure, it will produce two good crops each year.

The first cutting can be put aside for late spring feeding, and the second crop used to supply any deficiency of the pastures.

Every dairyman should be careful at all times to furnish a full supply of food for his cows, and of a quality satisfactory to the cow, and adapted to her daily wants.

Of the quality, the cow is without a doubt the best judge, as she will always indicate by her performance, if an opportunity be given her to choose freely between the different kinds offered, and the sole and only competent judge of the quality, as she will indicate by the amount she is able to consume, digest, and assimilate.

There is perhaps no failure so frequent among dairymen as that to supply their herds throughout the summer season with food adequate to their requirements, nor an omission so detrimental to their interests.

From a very careful study of dairy management in summer in the vicinity where I reside, the conclusion has been reached that but one cow out of three kept pays any profit to her owner. This, however, is not all from want of sufficient food, or from improper care. About one third of all the cows kept in the county of Herkimer, owing to constitutional weakness or physical debility, are unable to obtain a sufficient amount of food from our ordinary pastures to furnish one penny's profit on what they do consume.

This class of cows spend a considerable portion of their time in idleness, while the balance of the herd are feeding. These idle cows are as unprofitable to their owners as an idle man is to the community where he lives.

Another third part of our cows pay their own keeping and what the lazy or idle ones lack, so that the profits, if any there be, is received from the remaining third cow.

It has been ascertained from many careful experiments that the cow requires about two per cent. of her live weight of good hay, or its equivalent, as the food of support.

This amount of food the cow requires on an average to maintain her existence without giving one drop of milk, or adding one pound to her weight, and this amount of food she will first apply to herself, under the law of self-preservation so strongly impressed upon the whole animal kingdom. When we consider that pasture grass, at different portions of the pasture season, and under different conditions of growth, contains from sixty-five to eighty-five per cent. of water, and that a cow weighing one thousand pounds must consume from eighty-five to one hundred and five pounds of grass, in addition to her pay in grass for gathering it, which is at least twenty-five per cent., we find the cow weighing one thousand pounds, live weight, must consume from one hundred and ten to one hundred and thirty pounds of grass daily, to maintain her reputation of being the living cow of some owner. Taking the average quantity required daily through the pasture season, we have one hundred and twenty pounds of grass as the food of support necessary for a cow weighing a thousand pounds. Now, if a cow requiring one hundred and twenty pounds of grass to live, consumes one hundred and twenty-one pounds per day, the owner, by furnishing the one hundred and twenty-one pounds, gets a profit in milk, or increase of weight, on one pound of grass, as a profit, of $\frac{1}{120}$ part of the grass consumed.

Suppose the grass to be good and the cow able to consume two hundred and forty pounds of grass per day, then the cow will yield a profit on one half consumed, or one hundred and twenty times the profit she would if she consumes but one hundred and twenty-one pounds.

If the pastures are poor, requiring all the time and energy of the cow to procure what food she wants, little or no profit can be expected from what she does consume, and her board bill will be found to be an expensive one.

The quality of our pasture grass for summer food may be greatly improved by cultivating a variety of grasses. In seeding our pasture lands, every kind of grass seed should be used, known to be of value as cattle food, so that a succession of growth may be secured throughout the entire season. Then by giving our pastures proper care and the necessary fertilizers, all the grasses indigenous to the soil, if not sown will soon come in, and occupy the entire surface.

Before dismissing the subject of summer food for the dairy cow, allow me to suggest that whatever forage plants are used to supplement the pasture feed should be fed dry or partially dry, as better results will be obtained in milk, in butter, in cheese, and in beef, besides a saving in labor.

Of the summer care and management of the dairy cow, permit me to say that the milking should be done with clock-like regularity, that each cow should be milked by the same person and in the same order, as first, second, third, and so on to the last, throughout the season. No change of milkers or change of time for milking should be allowed, except for the most urgent reasons.

The food given the herd, in addition to that obtained in pasture, should be given in even quantities and at regular times from day to day.

Next in importance to a sufficient quantity and good quality of food for dairy stock in an abundant supply of good pure water, easily obtained.

Again, dairy stock should always have daily access to salt, so that they may freely partake of it as they prefer. When a herd is allowed free access to salt they never eat too much or suffer for the want of it. I need not advise this intelligent body of dairymen to let their cows take their own gait to and from the pastures, and that a cow " trot " is as unprofitable to the dairy interest as the average agricultural horse trot is to the cause of agriculture.

Winter Food and Winter Care of Dairy Stock.

As the mixed grasses, growing in a well-seeded and well-cared for pasture, are the highest type of cattle food for summer, so the mixed meadow grasses, with a small quantity of clover, cut when in blossom or sooner, with a small ration of roots, constitute, in my opinion, the highest type of winter food for dairy stock.

In fact, grass cut and nicely cured, when in the proper condition for winter food, may well be termed dried grass; and every element of nutrition contained in the grasses of summer is found in this, except the water, which may be very easily supplied by a daily ration of roots. Dairy stock, kept in good condition through summer and fall, winter at much less expense for food and care than those poorly kept through the fore part of the season. The difference is so great, that it has been said that a cow well summered is about half wintered.

In my own experince in wintering dairy stock, I have found the following practice satisfactory to me and apparently to my stock:

At five o'clock in the morning, feed all the good hay that the cows will eat; clean back the manure, and milk. After milking, attend to the hay, and, if more is required, provide it. After breakfast, commence watering by turning the young stock out first, and then the older, those in each stable by themselves, cleaning and dusting the stable while the occupants are out. If the weather is stormy, however, no more are let out at once than can drink together, and put back in the stable immediately after drinking, where each one finds a small lock of hay in the manger. Soon after noon, each cow receives a peck of sliced roots; but not more hay until nearly five o'clock in the afternoon, when they are fed all the hay they will eat up clean.

For old cows, and those that have milked down thin, meal may be fed with the roots to good advantage, in quantity to meet the requirements of the cow. But I am decidedly in favor of feeding cows hay but twice per day, leaving the cow ample time to masticate the hay undisturbed, which is a very important consideration for all ruminants.

We have some dairymen who believe it economy to winter their cows very cheaply on straw and corn stalks, or what is usually termed coarse fodder. These dairymen I pity much; but their cows more. I have heard them speak of wintering cows through to February, and even March, on coarse fodder in a sort of boasting way; but I tell you, gentlemen of the cow party, no man can cheat the cow out of her needful board without being bamboozled in the final result. I believe that the best way is to feed cows all the good grass they require, either dry or green first, and then as much coarse fodder as they may desire to eat.

Winter Care and Management.

Although the cow is regarded by many as a stupid animal, yet she likes to be comfortable, and requires, to secure that comfort she so well enjoys and so richly pays for, a good warm stable, well ventilated and well lighted.

Again, the cow should be kept clean, and not be compelled to lie down in her own filth; but as my friend, Prof. E. W. Stewart, will present his arrangements for keeping the cow clean and comfortable during her winter confinement, I leave that part of the subject for him.

Cows should receive a gentle carding each day during their winter confinement, and especially towards spring when they begin to shed their old coats of hair. No little act of kindness pays better, and no part of dairy management is more certain to be appreciated by the cow. A fractious, ill-tempered cow can be converted by the magic influence of the card, properly used, to an extent which, those who have never tried it would hardly believe.

The dairy cow, unlike all other animals, has no rest or respite from her first impregnation to the day of her death, unless she be both dry and farrow, from the mysterious production of her own kind, or the equally mysterious production of milk, and often performing both these functions at the same time. Some rest from milking, therefore, should be allowed her, and the proper length of time for her to go dry is best determined by her condition. If in good condition she requires less time than if in poor condition. But a rest from giving milk before coming in is better for the health and after usefulness of the cow than continued milking and high feeding.

Care of Cows at Parturition.

When the time comes for the cow to drop her young, she will usually manifest it to the dairyman by indications well known, and which I need not here describe. The first study is to provide a good pen or box stall, well bedded with clean straw, into which the cow may be turned where she can be alone, and without much change of temperature from the stable where she has been kept. If the presentation of the calf is natural, which may always be known by the appearance of the two fore feet, with the head a little back, resting partly on or between the fore legs, the cow as a rule may be left to herself and the laws of nature.

If the cow appears excited, as they sometimes do, a meddlesome midwifery would be of all things the most unwise, but left to quiet solitude in such cases nature will soon accomplish her work.

When the presentation is unnatural, the cow must have aid, and the sooner intelligent aid is furnished, the safer and better it will be, as a rule.

As soon as the cow drops her calf, give her a pail of cold water to drink, and if she appears thirsty, give her a pailful every half hour, until she gets all she requires. The water given her should be taken from the fountain where the cow has been accustomed to obtain her drink. No change of drink should be allowed, or change of food, until the calf is at least four days old, unless the quantity of food be lessened. She should be allowed to eat the placenta, if she desires to, as it is nature's own provision for her at that particular time. In cases where the cow neither licks the calf or eats the placenta, she should be given all her first milking, except what the calf requires.

In conclusion, allow me to say, that all the good food the cow may desire, with an abundance of pure water to drink, will not secure her owner an abundant supply of pure milk unless she have good, kind care. She should be exempt from annoyance of every kind and a stranger to fear. Anticipate every want, gratify every desire.

Treat the cow in all respects as you would like to be treated if you were a cow yourself. I have said, and will repeat it here, that there is no good place on earth for a brutal man, and of all the positions outside the family for him to occupy, most unsuited to his nature, is that of owner of a herd of dairy cows, dependent on him for food and care, and daily subjected to his brutal treatment. By an unfailing and irreversible law of nature, "like begets like," and as in our intercourse with each other, so also in our treatment of the lower order of animals, gentleness begets gentleness, kindness begets kindness, love begets love. On the other hand, strife will stir up strife, hatred will beget hatred, brutality will beget brutality. This has been so since creation's first marriage, and is destined to be the law to the end of time.

Prof. **ARNOLD**, being called out, spoke on the philosophy of preserving butter. He had found brine to be far preferable to water for washing butter, as it is a most efficient agent in which to dissolve the albuminoids which constitute the cheesy matter in buttermilk. If washed in strong brine before the pellets adhere into a mass the brine will cleanse the surface of all traces of buttermilk, and then if the butter be put into a crock with brine, the brine will insinuate itself between the pellets, and exclude the air, and the butter may then be exposed, even to quite a high temperature, without injury to its keeping qualities.

He once awarded a prize for the "best butter more than a year old," to a package of butter made in this way, that had previously taken two annual first premiums.

The philosophy of the matter is this: If a glass be filled with water, and a tube with the lower end tightly covered with a piece of animal membrane, as bladder, the skin of the stomach, etc., and a quantity of salt water put into the tube, when the tube is set into a glass of fresh water, the fresh water being attracted by the salt, will pass through the pores of the membrane into the tube, and the liquid within the tube will rise considerably higher than that in the tumbler. If then you add salt to the water outside the tube, making a stronger brine than that within it, the attraction will be reversed, and the water in the glass will rise above that in the tube, etc.

This is a proof of the fact that salt has a powerful attraction for water.

Now, the pellets of butter contain a portion of water. When they are immersed in brine the water is extracted by its attraction, and the pellet contracts in size, becoming very solid.

In this condition no salt enters the body of the pellets, but they remain perfectly fresh, and while unexposed to the air are not injured by a pretty high atmospheric temperature, but preserve their quality and flavor perfectly.

In this way butter may be shipped, for instance, to European ports, and when taken out by the receivers and washed free from brine, will be found as fresh and firm as when taken from the churn.

This quality of unsalted butter is very desirable in the European markets.

He looked upon this fact as a very valuable discovery for butter-makers. By it you may deposit butter in crocks or glass cans, sealed up, and preserve for years just as perfectly as you preserve canned fruit.

The members of the Committee on Shrinkage of Cheese reported the result of their experiments.

Cheese Shrinkage.

Report on shrinkage of cheese during the season 1878, at Rundeltown factory, as given by George F. Webb:

First trial cheese, made on the 1st day of June, weighed, on coming from the press, sixty pounds.

Second weight, June 15, fifty-eight and a half pounds.

Third weight, July 1, fifty-seven pounds.

Fourth weight, August 15, fifty-four and a half pounds.

Fifth weight, September 1, fifty-two and three quarter pounds.

Sixth weight, October 1, fifty-two and a quarter pounds.

Seventh weight, November 1, fifty-two pounds.

Eighth weight, December 1, fifty-two pounds.

This cheese was made to cure, ready for the market, in thirty days. Rennett enough used to coagulate the milk ready for the knife in forty-five minutes. The curd would spin by the hot iron test, three fourths of an inch. The curd was salted at the rate of two and a half pounds to the hundred.

Second cheese, made June 15, weighed, on coming from the press, sixty-four pounds.

Second weight, July 1, sixty-one and three fourths pounds.

Third weight, July 15, sixty pounds.

Fourth weight, August 1, fifty-seven and three fourths pounds.

Fifth weight, September 1, fifty-six pounds.

Sixth weight, October 1, fifty-five and one fourth pounds.

Seventh weight, November 1, fifty-four and three fourths pounds.

Eighth weight, December 1, fifty-four and a half pounds.

This cheese was made in the same manner as the first, but was not quite as firm as the one made June 1. I noticed, that while this weighed less each trial until the last, that the first cheese did not seem to change much between the last two trials.

Third trial cheese was made July 1. It weighed, on coming from the press, sixty-five pounds.

Second weight, July 15, sixty-two pounds.

Third weight, August 1, sixty and three fourth pounds.

Fourth weight, September 1, fifty-nine and three fourths pounds.

Fifth weight, October 1, fifty-nine and one fourth pounds.

Sixth weight, November 1, fifty-nine pounds.

Seventh weight, December 1, fifty-nine pounds.

This cheese was made a little different from the first two. Enough rennet was used to coagulate the milk in one hour ready for the knife. The milk was set at ninety degrees, and, after the curd was cut in cubes, it was slowly warmed to ninety-eight degrees. It was not allowed to pack at the bottom of the vat; but was carefully stirred up until it had taken on considerable acid, when it was taken into the drainer, and salted, at the end of thirty-five minutes, at the rate of three pounds to the thousand of milk.

Fourth trial of cheese was made August 1, when it weighed, on coming from press, seventy-three pounds.

Second weight, August 15, seventy-two and one fourth pounds.

Third weight, September 1, seventy-one and three fourths pounds.

Fourth weight, October 1, seventy-one and one fourth pounds.

Fifth weight, November 1, seventy-one pounds.

Sixth weight, December 1, seventy and one half pounds.

The cheese was made different from the others in this respect:

The milk was heated to ninety-six degrees, and enough rennet applied to coagulate the mass in one hour and a half, ready for the knife. The heat was kept at ninety-six degrees, and the curd gently stirred until acid appeared in the curd. It was then dipped into the drainer, covered over, and kept as warm as possible for one hour, when it was ready to put to press, after salting at the rate of three pounds to the thousand of milk. This cheese appeared perfectly solid when shown on the trier, and was the best flavored of the four.

My curing room is not as well adapted to the curing of cheese as I would have it. The room in which these cheese were kept is sealed with matched boards, and is on the first floor. In cold weather I can manage quite well by keeping a fire in the room, but during June, July, and August, it is too warm for the cheese. From the 20th of June until the 1st of August, there were many days when the oil would run down the sides of the cheese. They were too warm.

I have been repairing some this winter, and propose to seal the walls with heavy paper.

Respectfully,

GEORGE F. WEBB.

SHRINKAGE OF CHEEESE.

By Mr. G. W. CARROLL, *of Union City.*

In accordance with the appointment and direction of your worthy President, your committee, commencing with May 20, have thereafter selected a cheese from the 1st and 15th of each month, and have continued to weigh them every fifteen days, noting the shrinkage at each weighing, with the following result:

The shrinkage of a cheese from day to day is quite irregular, some days not showing any, and the next day showing a double quantity.

An invoice of one hundred cheese, cured for market, from fifteen to twenty days old, will shrink during the next five days twenty-five pounds, and the same during each of the next two successive periods of five days.

A cheese sometimes will not shrink much for a few days, or may even increase in weight a little in damp weather, but will generally make up for lost time in the next few dry days.

A green cheese placed in a curing room that gets very warm through the day and cools off at night will not shrink much faster than one in a room of even temperature, unless it gets warm enough to run butter before cured.

The loss by shrinkage on one hundred cheese during the second period of fifteen days of its age, at eight cents per pound, will be six dollars, or about one mill and five hundredths of a mill per pound. These deductions are gratuitous, but I will furnish our worthy Secretary with a couple of tables, the first classifying the shrinkage according to the age of the cheese, and the second according to the actual shrinkage during the same days of the month, and he can make his own deductions.

A cheese weighing from fifty-five to sixty pounds will shrink the first twenty-four hours of its age, one quarter of a pound; the first ten days, one pound and upwards; the first fifteen days of its age, during May, one and a fourth pounds; and during June, July, and August, two pounds; and during September and October, one and three fourth pounds. In the second fifteen days of its age it will shrink twelve ounces, regardless of time of year.

A lot of cheese in the third period of fifteen days of their age will shrink each ten ounces; fourth period, eight ounces; fifth, seven ounces; sixth, six ounces; seventh, four and a half ounces; eighth, four ounces; ninth, three and one fifth ounces; tenth, three ounces; eleventh, two a half ounces; twelfth, two ounces, regardless of time of year.

The total shrinkage on each cheese tested, from first to last, was as follows up to December 1st: May 20th, six pounds; June 1st, seven and a half pounds; June 15th, five and one eighth pounds; July 1st, five and three eighths pounds; July 15th, five and a fourth pounds; August 1st, four and five eighths pounds; August 15th, five and one eighth pounds; September 1st, three and three eighths pounds; September 15th, three and five eighths pounds; October 1st, three and one eighth pounds; October 15th, two and five eighths pounds; November 1st, two pounds.

Loss on each cheese, estimating them at what they could have been sold for when cured per pound:

May 20th,	30 cts.	August 15th,	22 cts.
June 1st,	27½ cts.	September 1st,	18 cts.
June 15th,	23 cts.	September 15th,	13 cts.
July 1st,	22 cts.	October 1st,	10 cts.
July 15th,	20 cts.	October 15th,	4 cts.
August 1st,	19 cts.	November 1st,	0 cts.

Table first shows the shrinkage classified according to the age of each cheese.

Table second what each cheese shrunk during the same days of the month, without regard to the age of cheese:

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
May 20,	1¼	1	½	½	½	¾	¼	¼	¼	¼	½	0
June 1,	2	1¾	¾	½	¾	¼	¼	¼	¼	½	0	0
June 15,	2	½	½	¾	¼	¼	½	0	¼	¼	⅜	¼
July 1,	2	¾	¾	½	¼	¼	½	½	0	⅛	⅛	¼
July 15,	2	¾	½	½	¾	½	¼	¼	⅛	¼		
August 1,	2	¾	½	¼	½	½	⅛	⅛	⅛			
August 15,	2¼	1	¼	¾	½	¼	⅛	⅜				
September 1,	1¾	¼	¾	½	⅛	0	⅔					
September 15,	1¾	¾	¾	0	⅜	⅛						
October 1,	1¼	¾	½	⅝	⅛							
October 15,	1¼	¾	⅞	⅛								

	1.	2.	3.	4.	5.	6.	7.	8.	9.		10.	11.	12.	13.
May 20,	1¼	1	½	½	½	¾	¼	¼	¼		¼	½		
June 1,		2	1¾	¾	½	¾	¼	¼	¼		¼	½		
June 15,			2	½	½	¾	¼	¼	½	0	¼	¼	⅜	¼
July 1,				2	¾	¾	½	¼	¼	½	½	0	⅛	¼
July 15,					2	¾	½	½	¾	½	¼	¼	⅛	¼
August 1,						2	¾	½	¼	½	½	⅛	⅛	⅛
August 15,							2¼	1	¼	¾	½	¼	⅜	⅜
September 1,								1¾	¼	¾	½	⅛	0	⅞
September 15,									1¾	¾	¾	0	⅜	⅛
October 1,										1¼	¾	½	⅝	⅛
October 15,											1¼	¾	⅞	⅛

RULES FOR MAKING GILT-EDGED BUTTER.

Feeding.

Select your cows with reference to the quantity and richness of the milk produced. The best cows are the cheapest for butter, so get the best you can of whatever breed you select. Give them good pasturage in the summer, and plenty of pure water, with frequent access to salt. In the winter, feed sweet early-cut hay, well-cured corn-fodder, roots, cabbages, &c., and a ration of bran, corn-meal, ground oats, or middlings.

Implements.

Have the best implements, and keep them scrupulously clean, well-scalded, and often exposed to the sweetening influences of the sun. The milk pail and pans should be of the best quality of tin.

A reliable thermometer is a necessity to every good dairyman.

Milking.

The milking should be done quietly, and at regular times, and the utmost cleanliness observed. Nothing is tainted quicker than milk by foul odors, and surely, at times, with nearly all cows, there is enough animal odor to it without adding any more.

Setting.

Strain the milk slowly into the pans, four to six inches deep. It is an excellent plan to strain the milk into a large can set in cold water, and cool down to sixty degrees, before putting into the small pans.

The milk must be set in a pure atmosphere, at such a temperature as will permit the cream to rise in from thirty to thirty-six hours after setting. In order to do that, the room should be kept at about sixty to sixty-five degrees, and not allowed to vary much either above or below.

In hot weather, keep a large piece of ice in a tub in the room. Cover it over with a thick blanket, and, if arranged so that the water will run off, it will keep a long time, and keep the room uniform.

In cold weather, some arrangement for warming the milk-room should be adopted.

Skimming.

Skim as soon as the milk begins to turn sour. Do not neglect this rule, as it is impossible to make butter from cream that has become old and sour. When you pour your cream into the cream jar, splash as little as possible. Stir the cream every time you add more to it, and wipe the sides of the pot. Keep the temperature at about sixty degrees, and the cream pot in the coolest part of the house, covered with a fine gauze netting strained on a hoop, not with a tight cover. If covered too tight, fermentation is often too rapid.

Churning.

Churn often, as there is nothing gained by long keeping. Bring the temperature of the cream in the churn to fifty-eight degrees, and not allow it to rise above sixty-four degrees. Churn early in the morning while it is cool. First scald the churn, turn the paddles a few times; then pour off, and pour in cold water, and turn the paddles; pour off, and pour in your cream. In churning revolve the paddles with an easy regular motion, not too fast nor too slow.

The butter should come in about forty minutes, a little more or a little less, if the temperature of the cream when put in was about fifty-eight degrees, ascertained by the thermometer.

Working and Salting.

When it has "broken" and there is a difficulty to make the butter gather, throw in some cold water and give a few more turns. Some, and I think a majority, of the best butter-makers of to-day wash their butter with cold water before removing from the churn. Gather your butter with a paddle and lift it out into the tray, press it gently and incline it, and let the buttermilk run off. Work it gently with the paddle, with a cutting, gentle pressure, but not to mash it; or, better, put into the butter-worker.

Salt it about an ounce to the pound, or to the taste of good customers; only with the best salt, and free from lumps and coarseness. Work the butter only so much as to expel the buttermilk, but not to work it too dry.

This can be done by the use of a weak brine prepared for the purpose. Put the bowl away in a cool place. After standing twelve or twenty-four hours, gently press out with a ladle or machine, the remaining buttermilk, and any brine that will flow out with it, care being used not to work it too much. If this is done the butter has lost it grain and becomes salvey, and its keeping qualities are greatly injured.

Packing.

Pack in vessels which will impart no impurities to the butter. Fill within half an inch of the top. Place a thin cloth wholly over the butter. Over that pour cold brine as strong as can be made of hot water and the purest salt, or cover with a layer of fine salt. The whole process of making the butter, from drawing the milk to the placing of the butter in packages, should be hurried, as milk, cream, and butter are going to decay every moment when exposed to the air, however pure it may be. Such butter is ready to keep or sell. If to be kept long before selling, surround every package with coarse salt, by placing them in boxes prepared for that purpose. This process keeps the butter cool and hard, and free from sudden changes of air. When all these things are attended to promptly, and with as much uniformity as is under the power of man to control, there will be a near approach to uniformity in color, richness, and purity. If the new beginner follows these rules, and keeps doing so, he will soon command the highest figures.

Cleanliness and common sense applied from the beginning to the end, are absolutely necessary to insure good butter that will bring the highest price in the market.

DAIRY BUILDINGS AND MANAGEMENT.

By Prof. E. W. STEWART, *of Lake View*, *New York*.

The old adage is, "that we have the darkest time just before day." Dairymen probably never had a time since the factory system has been organized when everything has looked so dark and so forbidding for the future, as during the past six months. It has seemed to them that the bottom has fallen out of everything, that there was no opportunity for making such progress and profits as they had made in the past. But we all remember that a few years ago, when we were getting top prices, when everything was prosperous, when any enterprise could be started and carried into success; we recollect very well that at that time we were running in debt at the rate of about two hundred millions a year. When we were so prosperous that we could not live within our income, we were spending two hundred millions more than we sold. When the crisis in 1873 struck us, and everybody began to shrink from enterprise, when everything began to cloud over, we began to examine our own recources, and the result has been that during the last three years, the hardest three years that we have had, we began to pay off our debts at the rate of two hundred millions a year. While we are in the gloom we can pay two hundred millions a year, and while were are prosperous we run in debt just that much. They look at us from Europe and say that we are the "rising nation, the most prosperous nation in the world," because they see that they are obliged to send us two hundred millions in cash for what we sell more than what we buy. I want to say that this matter that we regard as so unfortunate, I regard as an omen of the very best kind for the future prosperity of the dairy interest.

When people get a good price for their goods, whether they are good or bad, you do not expect them to mend; but when they do not sell for a profit, they immediately begin to inquire into the cause. Just as we, when the bad times struck us, began to pay our debts, so now we are just ready to look at this matter and see what we can do. I want to say to you, brother dairymen, in the future, it is skill that wins, the expert that is going to make the money. If you make the best goods you do not need a fugleman to sell them; the best always makes a market for itself; it can look with entire indifference on opposition.

There has been a great change in the public taste within a few years. Since the cheese factory and the creamery have raised the general character of dairy goods, even hotel guests do not like "a strong butter taste," and what would pass fifteen years ago is now wholly rejected. Improvement in dairy goods is now simply compulsory.

Barns.

I came here to speak to you with reference to dairy buildings, and the management of the herd; a subject which may be regarded as the foundation of successful dairying. I regret exceedingly that I do not see a larger number of manufacturers and practical dairymen, who, if I have anything good to say, ought to be benefited by it. But we must look at that in a philosophical way. It is only the advanced people that first start an improvement, and it must work from you, gentlemen, back to those who are the producers. The factory manager holds the key to the position. If he but wills he may entirely revolutionize the practice of his patrons. No factory should consider itself well managed until its patrons are organized, and meet to discuss all questions relating to their interests. This may be considered as the family—the unit in the system. I shall be extremely glad when every factory shall have become a school. The factory is organized for the mutual interest of all its members, and the association has a right not only to persuade but to compel its members to observe a uniform system, which shall produce a uniform quantity of milk. The difficulty is that the dairyman says: "I produce my milk and send it to the factory. I am not responsible for what follows." He throws off all responsibility. If the cheese shrinks too much, he lays it to the factory. If the flavor is not what it should be, the factoryman receives all the blame. Therefore, the factoryman must initiate improvements, and from him they radiate toward the producers. It is certainly for his interest to keep up an active organization of his patrons, where they shall discuss all matters of improvement.

In order to produce proper milk, you must have good cows and good surroundings. The time has now come when we must look every single point in the face to find where we can get profits. If the dairyman can cheapen the production of his milk, he has started in the right way to make profits. If he studies the question of temperature, the cost of producing milk under the most favorable and under the most objectionable circumstances, he will see what his reform must be. The time has come when the market for butter brings a better price in the winter than in the summer. This leads me to observe that the dairy system should not be a spasmodic system. Dairymen must learn to keep their cows in a temperature which will be nearly uniform the year round. In winter, as well as in summer, it costs very little, in comparison with the advantage, to make your buildings such as to keep out the cold or the heat. I hold that cows should be milked in the stable the year round. If you wish to have a warm stable in winter, you must have a cool one in summer. The same which is cool in summer will be warm in winter.

Octagonal Barn.

With reference to the economy of building, I don't propose that dairymen all shall immediately reform their buildings. But new buildings are to be erected, and dairymen should study economy with reference to these. We have been in the habit of building oblong barns, and we have simply studied how much outside wall we could get for the amount of space that we enclosed, instead of studying how much space we could enclose with the least amount of wall.

The custom of building stables ten feet wide and seventy feet long has prevailed in Norway as well as among ourselves. A circle encloses the largest amount of space for a given amount of outside wall. Here is a circle, (holding up a small hoop.) Now, as I narrow up the sides, (bringing it to the form of an ellipse,) you see the space becomes smaller and smaller, and if you bring them together, there is no space left. Now if you build in the form of a circle, you have the shortest outside wall. The square, where the building is not large, is perhaps the best, when the question of economy in timber and labor comes in.

In a barn forty feet square, you have twice the space you have in one twenty by forty. And what have you added? Merely twenty feet to the end walls. An octagon is just as easily built as the square, and by taking eight sides around a building you may have a large one, and no long timber is required. The curve of the circle renders the labor greater, but we can build the octagon with only slightly more outside wall than the circle, and you avoid its curves. An eighty foot octagon will hold three hundred and fifty tons of hay. Such a barn will hold, on the half of it, one hundred and fifty tons of hay, besides affording you a scaffold eight feet high in the clear, for all your farming implements and other purposes of storage, and on the scaffold will store three thousand bushels of grain in the straw. To give you an illustration, I had the misfortune to lose four barns in October, 1874, that were built on the old system. There were seven hundred and sixteen feet of outside wall to these four barns. The barn that I built to replace them is an eighty foot octagon, and will hold fifty per cent. more than the four. It does away with another difficulty: that of being obliged to have so many posts, which are constantly in the way. The roof is, of course, completely tied together, and self-supporting, resting only on the outside plates. The octagonal form is braced, one side against another, and can stand wind much better than the oblong barn. Since I built that barn, I have learned of almost a dozen roofs, of old style barns, blowing off. I mentioned that this form enabled you to build a roof without any interior posts. You not only save the outside wall by this form, but you save all this interior timber, also the work laid out on it. The sides being thirty-three feet two inches, including the door-posts. Eighteen posts are all you need to use in that barn, on the outside. If you take a long barn, required to hold as much, it would need more bents, and a larger number of interior posts, and in dimensions would be fifty by one hundred and ten, so that you not only get economy of space and convenience, but you get it for less money and with less labor.

It will be seen that, as you enlarge this octagonal form, (or when over ninety feet in diameter, the sex-decagon, sixteen sided form, is better) it becomes still more economical of outside posts. For instance, a barn one hundred feet in diameter, being sixteen sided, would require only sixteen outside posts, besides the door-posts, that is, one post at each corner, as the sides are only slightly more than nineteen feet ten inches, only requiring girts from corner-post to corner-post. This one hundred foot sex-decagon would hold just twice as much as an eighty foot octagon, and would only cost about one third more. This shows how the cost decreases, in proportion to space, as this form of barn grows larger.

There can be no doubt that the circular form brings the labor in to much smaller compass, this form of barn requiring less travel in feeding the animals and less labor in storing crops in it; but I know how tenaciously farmers hold to old ways and opinions, and since they will largely build the oblong form, it may be of service to show them how cheaply they may avoid many of the interior posts and beams which so obstruct labor in filling such barns.

New Way of Building Long Barns.

If the barn is but forty feet wide, and the posts twenty-five feet long, all the purlin posts and beams may be left out, and these obstructions thus avoided by using a long, strong brace from the top of each cross-beam, over the floor, to near the top of each outside post. If the floor of the second story runs lengthwise of the barn, each bent will have a beam, the top of which will be thirteen feet above the floor, running across the barn from outside post to outside post. Now, instead of the ordinary short brace from the top of this beam to the outside post, the brace should be six by eight inches square, of hard, strong wood, and have eighteen feet run from the post on the top of the beam, and ten feet run up the post, reaching nearly to the top. These braces should be framed into a slight boxing at each foot on beam and post, and firmly held in place by a three fourth inch iron bolt through the foot of the brace and beam or post, and the nut turned up on a broad washer on the foot of the brace. The nut may be tightened when the timber shrinks. This will hold the foot of the brace very firmly, and the brace, being so long, will hold the top of the post rigidly in its place, and prevent the plates from spreading. Then let the roof be between a quarter and a third pitch; the rafters three by six inches, and spread not more than thirty inches from center to center. Collar-beam each pair of rafters, four feet below the ridge, with one and a fourth by four inch stuff, well nailed. This will hold the roof as safely as purlins, and it will be practically free from obstructions above the beams. It is true these cross-beams over the floor will be somewhat in the way, as compared to the self-supporting roof of the octagon; but there is always room to elevate the horse-fork between the beams, and, there being no obstruction above, the fork may be run to the roof without hinderance. These strong braces from beam to post, being at the back side of the bay, and at right angles with the floor, will not at all obstruct filling or pitching out from the bay.

Let us call attention to the great economy as well as convenience of this improvement of the long barn. If this long barn be forty by one hundred and eighty feet, to compare with ninety foot octagon, it would require twelve bents; and, consequently, there would be twenty-four outside posts, requiring twenty-four strong braces bolted as described. The labor of framing these twenty-four braces would be less than framing twenty-four purlin posts. The forty-eight bolts, sixteen inches long, required to hold the braces, would cost, with washers, sixteen cents each, or $7 68 only, for this large barn. Now let us see what timber it would save: twelve cross purlin beams, eight by eight, twenty feet long—twelve hundred and eighty-four feet; three hundred and sixty feet of eight by eight timber for long purlin plates, being nineteen hundred and twenty feet of lumber; forty-eight six foot braces at the foot and top of the posts—five hundred and seventy-six feet; amounting in all to thirty-seven hundred and eighty feet of lumber, costing $40 or more, according to location; and the labor of framing this timber and putting together would be at least as much more. The average saving by the improved method would be $100.

It will be seen that from this long floor the barn can be completely filled to the ridge with the horse-fork, and would require but little labor in mowing away. In this form, the barn may be made any length desired, and may afterwards be extended at will. This form of long barn requires the smallest amount of timber and lumber consistent with its length; but the travel from each end of this barn to the center is ninety feet, whilst in the ninety foot octagon it is but forty-five feet, each having the same capacity. This barn is supposed to have a basement for the animals.

A Fifty Foot Octagon.

As I wish to illustrate small barns for feeding as well as large ones—thus meeting the wants of all—I select a size that would furnish all the room required on a fertile farm of fifty acres for crops, tools, and stock. This is intended for a basement, eight feet in the clear, in which all the stock on the farm will be kept. With a drive-way through the center of this basement, twelve feet wide, fifteen cows or cattle could stand on each side, with their heads to the drive-way, and, using two feet on each side of this floor for a manager, would leave a track for cart or wagon of eight feet. Behind each row of cattle would be room for four horse stalls of good width; but as such a farm would not be likely to have use for more than four horse stalls, the space on the other side would be used for lying-in stalls for cows, and calf-pens, etc. Here is abundance of room for all the stock fifty or seventy acres can keep, and everything is under one roof.

Let us now look at the main building above the basement. Posts are twenty-four feet long; and as many small farmers may wish to look at the cost of this barn in detail, we will give specifications of materials and cost, at the present low figurees, which may be raised or lowered according to locality:

Schedule.

	Feet.
Eight sills, eight by ten—twenty-two feet,	1,176
Four cross-sills, eight by ten—twenty-six feet, spliced,	692
Eight corner posts, eight by ten—twenty-four feet,	1,280
Eight plates, eight by ten—twenty-two feet,	1,176
Four floor beams, eight by ten—twenty-six feet, spliced,	692
Four door posts, six by eight—thirteen feet,	208
Four posts, under floor beams, eight by ten—thirteen feet,	346
Two scaffold beams, eight by ten—twenty-six feet, spliced, (these go under one floor beam, eight feet above the floor,)	346
Thirty-four girths, four by five—twenty feet, (five tiers on six sides, and two over door,	1,133
Two girths, four by eight—twenty feet, over doors,	106
Eight hip rafters, five by ten—thirty-four feet,	1,134
Eight middle rafters, three by eight—thirty-two feet,	512
Sixteen intermediate, three by six—twenty-six feet,	624
Sixteen intermediate, three by six—twenty feet,	480
Sixteen intermediate, two by six—fourteen feet,	224
Sixteen intermediate, two by six—nine feet,	128
Twenty-four joists, three by ten—fourteen feet, (lower floor,)	840
Thirty-four joists, three by ten—seventeen feet, (lower floor,)	1,335
Seventeen joists, three by eight—seventeen feet, (scaffold,)	578
Plank for barn floor, twelve by fifty feet, (two inch,)	1,200
Floor under scaffold, one and a half inches,	1,125
Floor under bay, one inch,	750
Floor on scaffold, one inch,	750
Forty-four braces, four by six—seven feet long,	616
Roof boards,	3,100
Total rough lumber,	20,551

Forty-five hundred feet six inch, well seasoned, dressed, and matched pine, one fourth added—fifty-six hundred and fifty feet—for siding and cornice.

Summary of Cost.

Wall, 1,487 cubic feet, (concrete,) ten cents per cubic foot,	$147 70
20,551 feet coarse lumber, eight dollars,	164 40
5,650 feet pine siding, seventeen dollars,	96 00
500 lbs nails, three dollars,	15 00
Sash and glass,	25 00
Carpenter work and board,	275 00
Painting two coats, (oxide of iron and oil,)	25 00
Total cost,	$747 70

Let us now look at the capacity of this barn. The bay, including half of the scaffold over the floor, will store fifty tons of hay. The scaffold on the other side of the floor, having the same square feet as the bay, and a height of fifteen feet to top of the plate, will hold one thousand bushels of grain in the straw, or a like bulk of other fodder.

The best place for the granary in the barn, or any other, is over the main floor at one end. Let some strong joists be laid across the floor-beams, and a matched floor, fourteen feet long, and of the width of the floor to outside of beams, be laid on these joists. Fasten some standards on the outside of of the floor-beams, two feet apart, reaching eight feet above this floor; side these up on the inside with matched pine. Now divide the space between these two sides into three parts, by erecting standards for two partitions, eight feet high. These partitions will be four feet apart, and, when sided up with matched stuff, will give three divisions or bins, which, being four by fourteen by eight feet high, will hold three hundred and sixty bushels each. If more bins are wanted, these can be divided in the middle, making six bins, four by seven by eight feet high, holding one hundred and eighty bushels each. These bins should all be floored over, with lids on top, through which the grain is emptied. Now make a draw in the bottom of each bin so that the grain may be drawn down through a cloth spout into bags. The grain is easily elevated into these bins by horses with the ordinary pitching rope and pulley; and the space occupied by this granary is not needed for other purposes. I have found this arrangement of grain bins to save much labor during the year. The space under the scaffold—seven hundred and thirty-five square feet—will give room for buggies, tools, etc. The floor over it being made dust tight, it will be as clean as any barn built for the same purpose. Let the small farmers scan closely this form and size of barn, and see if he can get more conveniences for as little money.

Basement Walls for Stables.

The stable is, perhaps, the most important single feature about the barn, as upon the merits of this will largely depend the profits of feeding animals; and as more crops are grown for feeding animals than for feeding man, everything in the construction of the stable bearing upon the comfort and growth of animals should be carefully considered.

The season of greatest growth in our domesticated animals is when the temperature of the air is sixty degrees, and upwards. If, therefore, we would try to imitate nature at its best, we must build stables in which the winter temperature shall approximate sixty degrees. This may be done by building our basement walls of material having very little conducting power. Double walls, having a space of dead air between them, effect this purpose the best; but as such walls are most expensive, we may adopt a concrete wall, which has an infinite number of minute air spaces, rendering it comparatively non-conducting. A thick, stone wall, in which some stones reach across the wall, will be found covered with frost on the inside in winter, and often with moisture in summer; but the concrete wall is never penetrated with frost, and is never damp, when properly constructed. This wall has another important advantage, besides its minimum of conducting power—rendering the stable cool in summer and warm in winter—it is the cheapest substantial wall where sand, gravel, and rough stone, or sand and gravel, or sand and rough stone, are not too far off. It can be built in most parts of the country at ten cents per cubic foot of wall; and as this wall does not require to be as thick as an ordinary stone wall, because a water-lime concrete is much firmer and stronger than quicklime, as used by masons, for every stone is bedded in water-lime cement, which soon becomes as hard as stone. We have a wall, eight and one half feet high, under a large barn, which has stood the heaviest wind and a great pressure, although it is only fifteen inches thick at bottom, and twelve inches at top. This is heavy enough for any sized octagon, because, in this form, one side braces against every other side. In a concrete wall, under a very long barn, it would be proper to have a short pier built against the inside every fifty feet, to prevent a side swaying in a strong wind.

In building the concrete wall, the service of a mason is quite unnecessary. You need only good, common laborers, one of whom is learned in mixing the materials in proper proportions. Any one who is capable of tending a mason, can mix the materials and superintend placing them in the boxes.

Preparations for Laying out the Wall.

If there is moisture to come to the wall, water-lime must be used, and it is well to carry two or three feet above the ground with concrete. The place should also be excavated one or two feet beyond the proposed wall, so as to leave an air-space on the outside, giving the wall a chance to dry and become hard. If, in any case, you go into the slate rock, which is always full of seams charged with moisture, you must not allow the concrete to be built against this rock, for the moisture in the rock coming into the thin mortar will cause the milk of lime to run out and leave an infinite number of fine pores through which water will run. But if no water is allowed to come to it while drying, it will be water and air-tight. It is also well to have a drain cut lower than the bottom of the wall on the outside, to carry off any water that might otherwise come against it, which will render the basement dry.

How to lay out an Octagonal Wall.

The shape of this wall may give some trouble to get it so exact as to receive the lower rim of timber or sills. It should come even with the outside of the sills. The plan I adopt is so simple and easily carried out that it is here given as a guide. The foreman in building this form of a barn will always have a working plan. Let him get the exact measure from the center to one corner. Now let him make a measure of this exact length, with a three eighths hole at one end—that is, from the center of this three eighths hole to the other end should be the exact length from the center of the octagon to one corner. Now, having found the center of your proposed space to be walled in, drive a stake here firmly into the ground, saw it off four inches high, bore and drive a three eighths pin into the top of this stake and place the hole bored in one end of the measure on this pin. Now bring the opposite end where you wish the first corner, and drive a peg at the end of the measure to make the first corner. Then take the pattern your carpenter has made for the sill (and he should always have an exact pattern, so that he may make no mistake) and put the outside corner on the center of this first peg, letting one man hold it while the measure is swung round to the other end of this sill pattern; and when the ends of the measure and pattern are brought together you have the second corner, at which you will drive another peg. Now move your sill pattern to the second peg, and carry your measure to the other end for the third corner, and so on till you come around to the first peg driven. If the work is well done you cannot avoid placing all your corners equi-distant from the center.

Constructing the Boxes for the Wall.

Having determined the place and excavated for the wall, construct the boxes as follows: take three by four scantling for the standards, a little longer than the wall is high, place these on each side of the proposed wall, as far apart as the thickness of the wall and the thickness of the plank for the boxes. The plank should be fourteen inches wide, one and a half inches thick, and of a length to accommodate the wall. If the wall is thirty-two feet long, then sixteen feet plank will be the right length. If these standards are placed fifteen inches apart, the plank inside the standards would leave twelve inches for the wall. The standards are held the proper distance at the bottom by nailing a thin piece of board across under the lower end, and fastening the tops with a cross piece. The wall is built over these pieces at the bottom, and they are left in the wall. The standards are plumbed, and made fast by braces outside. Now, it will be seen that these planks can be moved upon the inside of the standards as fast as the wall goes up. The planks on the outside of the wall will, of course, be longer than those on the inside, by the thickness of the wall. The door frames will have jambs as wide as the wall is thick, and will make standards for that place. These frames must be placed before the wall is begun. There will be a pair of standards at each end of the plank; but the pair in the middle of the wall will hold the ends of both planks. To hold the planks from springing out between the standards, take a piece of narrow, hard-wood board, two feet long, bore a two-inch hole at each end, having fifteen inches between them; put a strong pin, two feet long, through these holes some ten inches. Now, these pins will just fit over the outside of the box plank, and by putting a brace between the upper ends will hold them tight against the plank, preventing their springing out. Two of these clamps will be required for each set of planks sixteen feet long. Now, when the box planks are placed all around the wall, begin and fill in the concrete mortar and stone, as hereinafter described; and when you get round, if water-lime is used, you may raise the plank one foot and go around again, raising the wall one foot each day, if you have men enough. You will place the window frames in the boxes when the wall is raised high enough to bring the top of the frame to the top of the proposed wall. The jambs and sills of the window frames will be as wide as the door frames.

Proportions for Water-Lime Concrete.

If you have only sand to use, mix five parts with one of water-lime, thoroughly, while dry; then wet into a thin mortar and use immediately. But if you also have gravel, mix the sand and water-lime, four to one, then mix into this five or six of gravel, make into thin mortar and use at once. This will make a concrete of about nine to one. If you also have stones to lay with it, put these stones into the boxes and cover with this mortar, and all the stone you put in will save so much mortar, and make your wall stronger while new. If you use only sand and stone, then mix the water-lime five to one, and lay the stone with it. The way is to put a layer of an inch of mortar in the bottom, and then a layer of stone, then of mortar and so on, letting the mortar come over the edge of the stone.

If the stones are not permitted to come quite to the outside of the wall, the mortar over them will prevent them conducting moisture or frost through. The mortar should be tamped in, so as to fill every crevice.

Placing Concrete Wall Under Old Buildings.

It is often desirable to raise a building and put a wall under it, but when laid with stone in the ordinary way, the shores or blockings are in the way of the wall. With a concrete wall the matter is easy. Raise the building to the height desired, level it on the blockings; then place three by four scantlings plumb under the center of the sills, in sufficient number to hold the building exactly in position, brace these from the top and take out the blockings. Now set the standards, place box-plank and build the concrete around these scantling. They will be in the center of the wall, and will not injure the wall by rotting. In this way a building may be raised and a wall put under it very cheaply; forty by forty may have a wall eight feet high for only one hundred and twenty-eight dollars. The cost would be repaid the first winter in the saving of food in wintering stock. The concrete wall is so tight as to exclude the air, and windows may be put into the wall wherever desired, except at the drive ways. We urge this method upon farmers, because they may thus have a warm stable, at a small expense, without erecting new buildings.

Lighting the Stable.

This brings me to the point of lighting the basement. The idea of a basement in the old style (dark) should be banished. Animals are just as much pleased with light as we are. See how, in the winter time, your pet cat or dog seeks the spot in the room where a streak of sunshine falls, and lies down there. Every stable should be made as light and as cheerful as any man's parlor; there is no reason why it should not be. In this connection, I will relate an experiment which I carried out in order to satisfy my curiosity as to the effect of light upon animals. I took two calves, both of them a bright red color. They were exactly the same, and both good eaters. One of these, after it was ten days old, I put into a dark room, and in order to have it completely dark, I had a spout on the outside, and let the milk run through into a trough to feed it. The other calf was in a light, airy, pleasant place. Both fed upon the same food. At ninety days you would not have supposed that the two calves looked alike to start with. You could see a great contrast; its color had faded, and instead of a bright red, it was nearer a mouse color. The dark housed calf weighed seventy-five pounds less than the other, and although it was afterwards put with the other, and had the same food, it never overcame the set-back it got in that dark room.

Sunlight is just as necessary to animal life as to vegetable life.

Cows are often kept in such dark stables that when they come out the light is painful to the eye, as is evidenced by their nearly closing their eyes, even stumbling on account of imperfect sight. This matter of dark stables should be considered by dairymen everywhere, for they are more frequently found than light ones. It is probably owing to a short-sighted economy—saving expense of windows. Such stables would have a most disastrous effect upon cows, if they were not turned out often.

Watering Cows in Stable.

Another point in this connection. I hold it is just as important that your cows and other cattle should drink their water unmolested as it is that they should eat their rations unmolested. You know when a lot of cattle go out to a trough one will master the others, the timid animals will be shying around in the corners waiting for the others to drink, and perhaps will have to go back to the stable without having had sufficient water; and the water is drank at a temperature of thirty-four, thirty-five, or thirty-six degrees That is taken into the stomach. What is to be done with it? They have got to warm it up to blood heat. If you water your cows in such a basement as I have been speaking of, the water will usually be about sixty degrees. Just think of the difference between thirty-four degrees and sixty degrees. There is twenty-six degrees this water has got to be raised in the cow's stomach. Practically, you burn so much food in the cow's stomach to warm this water. You never get something for nothing. We cannot warm water in a cow's stomach without using food to do it. I have for a great many years watered all my animals in the stable, using a V trough made of two boards nailed together at a convenient angle, the seam in which is filled with white lead. The lid of this trough serves for the bottom of the manger. The lid or lids being raised, the cows drink as the water passes them. You can water your cows quicker than in any other way. Now, with reference to the water. Here, in Pennsylvania, you have no trouble about getting water. You can bring water from a short distance in a pipe. In hundreds of places in this State you can make a perpetual flow of water with a siphon. If you can get your delivery end even one foot lower than the other, the water will flow when you get it started, as you can with any jack-pump hitched to the end of the pipe. At my place I have no springs. I can get water enough for a hundred head of cattle from the roof of my barn. I run the water from the roof of this barn into a reservoir that holds fifteen thousand gallons. The question, of course, comes up, whether rain water is as good as spring water. I should prefer spring water, yet I find that the animals are perfectly healthy. That way to get water is feasable in any place. I run a pipe from the cistern into the basement, thus making the watering of my stock a comparatively easy affair.

As I said, you can figure very easily the cost of such a basement. I undertake to say that there is no earthly doubt that where a man has got from ten to fifty cows, and upwards, he can fix it up for the advantage that would be gained in two years. The larger the number of animals, the sooner he would get back his pay. It costs less in proportion to make accommodation for a hundred cows than for ten. If you estimate it at ten cents a cubic foot, you will see it costs but a small sum.

Again, the basement should be above ground. I don't want to put a basement in a side hill. You want a basement for cattle dry; not a damp basement. And I would say, don't build a low basement any more than you would build a low story in your house. You want plenty of room. I don't think a basement should ever be less than eight feet, and nine feet would not be extravagant. My own is eight feet six inches. It is not an expensive matter. Let us consider for a moment what you save by this wall and this warm basement. The temperature of my basement is about sixty degrees. Now, in summer, the moment you go into the basement, you have got into a new atmosphere. With the other kind of wall, it happens, from its thinness, that you get outside temperature, and, with animals in it, a good deal worse than outside temperature. Ventilation is a matter of importance. If you are going to have a close basement, you must have plenty of fresh air. My friend, Prof. Wilkinson, ventilates by the sub-earth duct, and I think this a very good plan. A good aid to ventilation is a high barn. Never build a low barn. You have the same cost for roof whether you have a high barn or a low one.

The following description of my self-cleaning stable is taken from the *National Live Stock Journal.*

All dairymen and cattle feeders have felt the necessity of some device that should lessen the daily labor of cleaning the stable, and especially that should succeed in really keeping the cow clean—a most necessary requisite to clean and wholesome milk. There have been various plans of using a gutter behind the cows or cattle; but in all of them the cow was liable to get soiled upon the flank, and the tail would fall into the gutter, and render the milking most offensive. There have been methods devised for holding the tail from falling by suspending it upon a hook in the brush, so as to prevent it from dropping quite into the gutter, but this is seldom used for want of proper attention in the milker. If, therefore, a platform can be made which requires nothing to aid it in keeping the cow clean, provides for her comfort, is self-acting, durable, and cheap, there would seem to be little left to accomplish in this matter.

The Platform

we are about to describe does all this, and is now in use, and accommodates twenty animals. It is situated in the south half of the octagon basement. The platform consists partly of wood and partly of iron. The wooden part is situated next the manger, three feet four inches wide, and raised twelve inches. Behind this an iron grating, resting on stone posts at the back side, and on the wooden platform in front.

The gutter under this iron platform is excavated in the slate rock, four inches deep on the side next the plank, sloping back to eight inches deep at the back side. This gutter is four feet wide, and is concreted so as to be water tight. The platform is raised twelve inches above the base line of this story; and as the gutter is eight inches deep, the depth from the under side of the platform to the bottom of the gutter is twenty inches. This is the capacity of the receptacle for the manure; and, practically, it holds the droppings of cows for three weeks, if no muck is used to deodorize it; but when the latter is used, it has a capacity for a little more than two weeks' droppings. The depth of the gutter is quite sufficient to hold all the liquid. On the top of the stone posts is placed a three by three by five sixteenths angle iron sill, on which rest the iron joists one half by two inches, set edgewise, four feet two inches long, and placed eighteen and a half inches apart. Across these, at right angles, are laid wrought iron bars, three eighths by one and a half inches. These flat bars are fastened to the iron joists by quarter-inch round iron staples striding the joists and coming up through the flat bar and being riveted. There are twelve of these flat bars in the width of the open part of the platform, and the bars are placed one and five eighths inches apart, which makes the open part of the platform three feet three inches wide, with a plank ten inches wide behind. This makes the whole width of the platform seven feet four inches.

It will be seen that the animal stands with the forefeet upon the plank, and the hind feet upon the flat iron bars. The droppings fall directly through the openings into the gutter below when the manure is thin; and in winter, when dry food is given, the droppings fall through, with any touch, so that the moving of the hind feet works it all through. The cow stands across the bars, and has always two bars to stand upon, some large cattle's feet reaching the third bar. The cows have stood upon this platform some twenty-two months, and have been most quiet and satisfactory.

These flat bars (fifteen feet ten inches long) are placed end to end, so as to form a continuous bar, smooth and straight, for the whole length of the platform, (sixty-three feet four inches;) and if great neatness is desired, it may be brushed off clean as fast as a man can walk.

This iron grating is made of refined wrought iron, and the general reader may suppose it to be very expensive and only to be indulged in by fancy dairymen, with more means than experience; but this is quite a mistake.

The iron platform, all put together ready to be attached to the wooden platform, can be furnished at six dollars per cow.

Another point to be considered is, that with such an iron grating there is nothing to rot. The wood work never gets wet. In case the cattle are placed in the story above the basement, and the manure dropped into the basement—this iron grating letting all through at once—no urine is permitted to wet the joists and sills of the barn, to rot them. This consideration of durability will pay the whole expense in ten years, and the saving of labor will pay the whole expense in two years; besides, the pleasure of seeing clean animals will pay the expense in one year.

To render this iron platform portable, so that it may be sent to any part of the country, ready to be attached to a wooden platform, it will be made in sections of the width of two stalls, provided with hinges and staples, requiring no labor to attach it. It will be made with iron posts, taking the place of the stone posts. This form will have the advantage of turning up on its hinges upon the wooden platform, leaving the manure under it uncovered when it is desired to haul it out. The platform may be set at any height required, depending upon the height of the basement, or it may be placed in a stable over a basement, where the manure will take care of itself for many months. These sections may be placed end to end, and the bars will be level and continuous, as if all were in one section. This will enable it to be applied in a small or large stable with equal convenience.

With this method the liquid manure is all saved, as the receptacle under is water tight. It is not necessary to concrete the gutter, for if it be puddled with clay it will hold all the liquid, and a plank may be laid for the legs of the iron grating to rest upon. The stable must not freeze in winter, as that would close over the grating.

Method of Fastening.

Now let us examine the method of fastening. All feeders would like to give the animal freedom of motion and comfort in position, if it could easily be done without much extra labor and expense. As the most comfortable method, the box-stall is made for luxurious animals; but this is too expensive for cattle, except the most expensive thoroughbreds, and can never be used, except for these pet animals; so that the general dairyman is content to place his cow's head between two sticks, called stanchions. This last mode has simplicity and the minimum of labor to recommend it, but that is all. It ought to be abolished, and for this purpose we have devised the plan described. A post, four by six inches, stands between each two cows, and fourteen inches above the floor is driven a three quarter inch staple, twelve inches long, into the center of the side of the post. There is another staple driven into the opposite post, and a quarter inch coil chain stretching from staple to staple, with a ring on each end, to slide up and down on the staple, and a ring in the middle, into which the animal is to be fastened. A leather strap, one and one half inches wide, around the cow's neck, with a strong breast-snap on, is riveted with three small copper rivets. The cow is now brought upon the platform, and the snap is snapped into the ring in the middle of the chain. The cow is thus held in the middle of her space, and cannot move sidewise to annoy her neighbor. But as there is a little slack to the chain, and the strap can slip backward and forward upon the neck, she can move forward or backward, can lie down or get up as easily as if not fastened at all, and can turn her head, and lick her shoulders or any part of her body as freely as she chooses. Her movements are remarkably free, and her position in lying down as unconstrained as in the field. In order to allow this freedom of backing up without permitting her to pass her horns past the post to annoy her neighbor, a plank twelve inches wide is set up edgewise behind the post, and, not being able to back past this plank, she cannot molest her neighbor on either side. A plank five feet long is set against the front edge of the post, reaching down to the manger, with a circle cut out near the bottom to allow the lid of the water-trough to open. This plank in front prevents each cow from eating her neighbor's food. This method of fastening is nearly as cheap as stanchions, and is free to all who choose to use it.

ADDRESS OF PRESIDENT J. H. LENHART.

LADIES AND GENTLEMEN: It is not my intention at this time to inflict upon you a long speech. I have been announced on the programme. Therefore I suppose it will be expected of me to say a few words. In the first place, I would be different from most of mankind if I did not acknowledge the high compliment paid me in my selection to the presidency of the Pennsylvania State Dairymen's Association, which has been presided over for the last five years in such an able manner by my predecessor, through whose indomitable energy and perseverance, and the aid of this Association, there has been a wonderful impetus given to the dairy interests in this section of the State. We have, as an association, aided some little to prove that Pennsylvania is worthy of the name, and contains all the essential elements of wealth and prosperity.

I assure, you gentlemen, that I fully appreciate the honor you have conferred upon me, and shall cherish it through life. I hope I may prove worthy of the confidence reposed in me, and use my utmost power to increase the efficiency of our organization.

By the aid of the good workers in the cause I see around me, and who I believe will continue to work as nobly in the future as in the past, I feel confident that we will be enabled to do some good for the future of our State. I appreciate the honor more fully because it was not my own seeking, but your own free offering.

The dairy interest of western Pennsylvania has become a leading business, particularly in Crawford, Erie, and Mercer counties. Its influence has been seen and felt in all departments of industry, because whenever one branch of business is more profitable than another, and brings a large amount of money into the county, then all persons engaged therein seem to prosper. It is a fact that cannot be doubted, that while many other industries of the county for the last few years have been in a depressed condition, the dairy interest has moved along steadily.

Had it not been for the prosperity of the dairy business in this section, I feel very confident that we would have felt the pressure of the panic much more than we have. It therefore behooves all business men to give it aid and encouragement in the future as they have done in the past.

At this meeting of the Association we have a number of subjects named to be discussed, which are of very great importance to the members of this Association, and not to them alone, but to all that feel an interest in the prosperity and success of the business. I feel confident that they will be ably handled by the gentlemen who have been appointed to give information on the same. It will not be expected that I shall say a word on the subjects named. The gentlemen who have been named, I feel confident, are fully able to do justice to the subjects, and give you more information than I could think of doing. Therefore, I shall leave the discussion of the subjects named in the programme to them, and proceed to name a matter which I think has never been discussed in this Association, and perhaps some of you may think that it is not a proper subject to be named here. Notwithstanding some of the members of this Association may differ with me on the subject matter I wish to bring forward, I will venture to name it, and hope it may receive your attention hereafter—namely, the adulteration of food.

If I am not mistaken, it is more than twenty years since the agitation was first commenced in England, over the report of the adulteration of food, and no one can doubt that the stringent regulations which grew out of the discussion and were incorporated in what is known as the "adulteration of food act," has been of great benefit to the people of that country. It is certainly high time that we as an Association should do something to assist in this noble work to stop the alarming adulteration that has been going on here in nearly all kinds of food and medicines. I notice with pleasure the movements now on foot in various parts of the country to secure the necessary legislation to put a stop to this evil.

It is now generally conceded that almost every article of food in use is more or less adulterated. Strength, flavor, and color are artfully simulated by the use of red lead and other pernicious substances, and in many cases done in such a manner as to render it almost impossible to detect the deception. And flour, too, the staff of life, is adulterated with plaster of Paris, sand, bonedust, and other equally impure articles. I have seen its tated in New York city papers that several mills are kept running in New York grinding up white stone for the purpose of adulteration. I presume this is a mixture with flour, sugar, etc., and sold in the market as pure articles of food. I submit to you, gentlemen, should we not inaugurate a strong movement to do away by legislation with some of these ills in which we are all so much interested? I trust as an Association we will use all the means in our power to prevent the adulteration of cheese and butter within the boundaries of our Association, and prove to the world that the Pennsylvania State Dairymen's Association is in favor of and determined to make none but pure butter and full cream cheese and opposed to all adulteration of whatever kind it may be.

Lively discussions followed, which were introduced by **JOHN COLE**. He said all have found it easier to preach than to practice. The interest of producers, factorymen, and buyers, he considered were one. In regard to the President's remarks on adulteration, he said we do not adulterate to make money, but we are not careful enough about keeping out foreign matter. Manufacturers say, send good milk and we will make good cheese. If he now fails he charges the producer. If he insist on rejecting poor milk, he cannot do so. I should insist on receiving only good milk.

D. A. WRIGHT said that last year he tried Arnold's method of ventilating cans on one wagon, and found it a grand success. Intended to adopt the plan on all his wagons this spring. He thought, with Prof. Arnold, that milk ventilated in the cans was better the further it was drawn. We should adopt some plan for refusing bad milk. Last year he told a patron he skimmed, and he denied it, but when proven to him he acknowledged it, and said that the year before he milked two cows and took off two quarts of cream; this year he milked ten cows, and, as he took off less cream than he did the year before, he thought he was doing about right. He did'nt get mad about it, consequently I consider him a pretty good man.

Dr. J. H. GRAY said he was fond of skim cheese, but he wanted it good.

Was going to charge the factorymen with the bad cheese. Don't know of but one man who can tell a skim cheese.

A. B. Ross said he was not acquainted with the methods of making cheese, but as regards cleanliness, he censured the habit of washing teats and allowing the drippings to fall into the milk.

J. M. Bigger thought milk made better cheese after having some age, and in response to a question raised by D. A. Wright, said perhaps the main reason why good cheese were not made Saturday night, was because the maker was sleepy. Factorymen should be sustained in rejecting bad milk. If responsible for their product, would get a better article; but it does not always follow that bad milk is the cause of poor cheese.

THE MANUFACTURER'S RESPONSIBILITY.

By H. M. Cutshall, *of Randolph.*

Mr. President and Gentlemen of the Pennsylvania State Dairymen's Association: Some three weeks since, I received a communication from the Corresponding Secretary of this body, asking me to deliver an address at this meeting.

I have never attended one of these meetings; but I have been a constant reader of the doings of this Association since its organization.

Interesting papers have been read at these meeting, which have brought out intelligent discussion upon all topics which relate to the dairy. Men of wisdom and experience have read papers and lectured for the benefit of those engaged and interested in the dairy, and it is with diffidence that I attempt to entertain such an audience as this.

There are connected with this Association, men who have been interested in the Board of Trade from its origin down to the present. The Board of Trade is looked upon by some as a ring, in which all who have products sold through its influence are made the victims of ring rule. There are others who can see in it the means of all receiving a more uniform price by being posted in New York prices. etc., and to-day it is one of the institutions which has grown to be an honored factor in the dairy business, and has given to the dairyman, through its influence, a commission house which will be controlled and run by three persons who have, by the interest which they have taken in our welfare, become popular to the dairymen of Crawford county, and justly deserve the hearty coöperation of all interested in dairy products.

The subject upon which I have been asked to base my remarks is: What is the manufacturer's responsibility in receiving milk? Shall they be sustained in rejecting milk out of condition?

It seems to me, Mr. President, that this question might be answered in the affirmative by every patron in Crawford or any other county. You may ask any dairyman what it takes to make good butter or cheese, and the first thing he tells you is, good milk. There is no one so ignorant but can see at a glance that good milk is absolutely necessary; but how to get the same is what puzzles and perplexes; and in striving for the successful solving of the problem, the minds of men have been wont to ache. They are liable to have more aches, and until we are successful with a solution, the consumers of poor butter and cheese are doomed to have the stomach-ache.

While we are all ready to acknowledge that good, pure milk is necessary in order to have good butter and cheese, all are not capable of judging what is good and what is not; and how to remedy the difficulty so that it may be harmonious to both patrons and manufacturers, is the great stumbling block which lies in our pathway, and must be removed before we can proceed.

I noticed in the report of the proceedings of this Association at Meadville, some of the noted gentlemen present said that they could see in the lack of money upon which to do business, the evil of our low prices the last season, and, yet, in the face of all this, good goods were active, and did not go begging for a market. How natural, when we have mishaps and trouble, to look somewhere for a place upon which to put the responsibility besides upon ourselves. Well, the shoulders of Uncle Sam are broad, and, no doubt, able to bear it.

We have reached a point in the manufacture of butter and cheese when they, like other wares, will have to be sold upon their own merits, and the sooner we produce an article which will command the top price, the better.

The manufacturer of dairy products should be a person of great stability; one who could be depended upon. When the spring meetings are held, and rules and regulations acted upon and passed for the governing of factories for the season, they should mean something. Resolutions are good, but they are not worth the paper upon which they are written, unless they are carried to a successful termination. When a rule is passed which says the patrons *shall* furnish good, pure, unskimmed milk, it should mean just what it says, and the manufacturer is just the one, and the only one, who can see that this is faithfully carried out. Let us for a few moments look into the system, if such it can be called, for producing and furnishing milk.

I feel that I would be doing those engaged in the production of milk an injustice by trying to shoulder all of bad-flavored, unmarketable, low-priced cheese upon the manufacturer as his fault alone. If, *you*, gentlemen, could visit the barns and pastures where cows are kept, *where they are obliged to stay*, for in many cases it requires the rope, stanchion, or fence to prevent them from seeking some more enticing and comfortable abode. Just think for once, Mr. Chairman, of cows that are obliged to lie down in the filth which accumulates in stables every night through our long and dreary northern winters, and, when spring-time comes, she goes forth to pasture with her hips, sides, and udder loaded with filth which requires not only the gentle rains of spring, but far into summer to eradicate. People who are so negligent concerning the comforts and wants of their animals generally do their milking out of doors, and oft-times they can be seen milking during a shower or in rainy weather, the drippings from the cows falling into the milk, and then ask what is the reason that we do not get the top price for cheese. But the fault does not end here. There must be a great revolution in the manner of delivering milk to factories; and the first great step necessary is to stop the practice of drawing milk six or eight miles to get it to the factory. The time was when factories were few and far between, but to-day they are located at almost every village and cross-road, and, as a consequence, there is a great amount of pulling and hauling for milk. One patron gets offended because his milk is rejected by the manufacturer, and the next morning he puts it upon another wagon, and sends it to another factory. No questions are asked, because it brings a little more money into the coffers of the owner, and such works virtually put a premium upon negligence, and the efforts which those who are striving to produce a good article of milk, in order to get the best returns for their milk, are thwarted, until you have crowded out of the business some of the best and most intelligent dairymen. Prof. Arnold said, in one of his lectures in this county last summer, that he could detect in every factory he had visited, where the mixing of the night's and morning's milk at dairies was practiced, an offensive odor in the cheese, and he termed it as one of the greatest reforms which we needed, if we hoped to compete with other sections who are making rapid strides toward perfection in cheese and butter. He also recommended the aerating of cans in order to let offensive odors escape while milk was *en route* for the factory. How many factories in Crawford county put these suggestions into practice? I will venture to say not one. Why? *Why is it* that when you have taken the pains to institute a series of meetings, and get patrons out to hear some one who knows what we need, that you do not put such teachings into practice.

It is easy enough for a teacher in our schools to say, "Johnny, your father buys you books and sends you to school, you ought to learn your lessons." It is the teachers duty to see that he does learn them; and factory owners, you have got those same Johnnies in the dairy business, and you must see that the lessons taught by those competent to teach are not only learned but practiced.

These are small things, and may be considered of minor importance, but but they are to the milk business what drops of water and grains of sand are to the land and sea.

It is deplorable that this condition of things exists, which necessitates the using of so much time in the discussion of a subject which all should understand and practice. It is equally to be regretted that the people must be taxed to build our jails and penitentaries for the confinement of those who disobey the laws of our country.

We have to take people as we find them, and by education teach them to be better citizens. We have also got to take this factory business as it exists, and by perseverance and straightforwardness bring it up to that standard of excellence which all lovers of butter and cheese so earnestly desire.

I feel like suggesting a *modus operandi* for all factories to adopt, which, in my mind, will do a great good in the furtherance of the objects which we have in view: At the spring meetings of cheese factories rules and regulations are acted upon which govern the business of that factory for the season, and it is more than likely that not more than three out of five of all the patrons of the factory are present. They disband and go home, and are never seen at the factory again that summer, unless it is to haul a load of cheese or get a check, etc., until the next year. Now, gentlemen, this, in my opinion, does not look much like coöperation, and if, perchance, the manufacturer should send back a mess of milk which, in his judgment, is not fit for use, in nine cases out of ten the patron is offended, for did you ever know any farmer that did not have a better thing than his neighbor? and he sends his milk to some other factory, and thus the aims at good production are again thwarted.

What we want and need, and what we mnst have, is a closer understanding between the patron and manufacturer. Some means have got to be taken to bring them together once in two weeks, or oftener if possible, and then have a good, candid, fair talk, exchange ideas, and if there is anything wrong with my milk, let me know it. Do not be weak-kneed, but let the manufacturer be not afraid, for this is a subject that can be handled without gloves. Sooner or later, manufacturers and factory owners, this must come. The sooner the better for all interested. The summer season is short and farmers are busy; they have not much time to spare, but there might be a consolidation; a "scrub-horse race" might come off at or near the factory, and *after* it was through, we might drop into the factory and discuss the subject a few moments, just getting home when the women are done milking. Some of you may consider this painted a little, but it is a fact that too many of us look upon the part which we are to take in producing of milk for factories, as of secondary importance, thinking that simply milking the cows and turning it into the can, that there our responsibility ends.

Now, Mr. President, these are some of the difficulties which lie in the road of producing a first-class article of butter and cheese. They all could, so far as good milk is concerned, be removed at the dairy, if all were capable of judging and would act accordingly; but, as I have before remarked, it seems as if such was not the case, and as the manufacturers are supposed to be capable and without prejudice, to them must we look in a great measure for the eradication of this evil.

It is no doubt a fact that even they cannot always tell whether milk is in a condition fit for making a good article of butter and cheese or not, but for the most part they are; and for this reason, to them we look for perfecting the products of the dairy.

You must first instil into the minds of patrons the necessity of good milk, if they wish to get good butter and cheese, and when they understand this, the most stringent measures should be used, if necessary, to furnish a first-class article of milk, and reject all that is not.

As long as there is such a superhuman effort made by factory owners and manufacturers to get all milk possible, these results are slow to be attained. If all men were allowed to send their milk just where they wished it to go, all milk would soon find its way to the factory which is run in the interest of the patrons as well as the owners. The idea which I have advanced, that men do not send *their* milk to the factory they prefer, will seem to some of you, no doubt, strange, but such is the case. It is quite inconvevient for all patrons of factories to haul their own milk, and if they could, after reading the essay of Mr. Blanchard upon the wickedness which farmers' boys learn by hauling milk, they would not dare to put *their* boy upon the milk wagon, and consequently they must hire it hauled, and they must put it upon the wagon which passes on their road. Thus, you see, they are obliged to send where the wagon goes.

There are men who are always for sale, and they will say they want to sell their milk, and not be bothered with hauling cheese, and other minor duties; and then there is an auction, with factory-owners and manufacturers as bidders, and when one or two sell their milk on our small milk routes, the route is controlled, and the rest send their milk and pay more than they need for manufacturing, for milk that was bought last season at ninety cents and one dollar per hundred, proved a loss to the buyer, and yet some will no doubt repeat the same folly this season.

In conclusion, I would say that all manufacturers should reject all milk not in a condition to make a first-class article of butter or cheese, and by so doing you will retain those who are an honor to your factory, an honor to your neighborhood, and honor the business they are in. The system of receiving poor milk, and consequent making of poor butter and cheese, has already driven from your factories some of the ablest and best dairymen of the country. Let us heed the warning and escape the doom.

D. A. WRIGHT inquired what he should do with milk that curdled in the bottom of the can and yet appeared sweet and all right otherwise.

S. A. **FARRINGTON** responded: Send it back. The curdling comes from taint. The art of cheese-making is a chemical operation, often difficult, and it is the easiest thing in the world to make a poor article from a good product. If other branches of business had been handled as loosely as this, they would have been failures long ago.

REPORT OF THE COMMITTEE ON THE INTERNATIONAL DAIRY FAIR.

By S. A. FARRINGTON.

The first International Dairy Fair ever held was suggested by Mr. X. A. Willard, of Little Falls, New York, to Mr. J. H. Reall, of New York, who proposed it at the meeting of the American Dairyman's Association, at Cleveland, one year ago. The proposition was very favorably received by the dairy press and public throughout the country generally. Accordingly, New York was selected as the place, and December 2d the time, for holding such fair. Through the indefatigable efforts of Messrs. F. B. Thurber, J. H. Reall, F. D. Moulton, M. Folsom, and T. Mortimer Seaver, of New York, who meant to know no such word as fail in this enterprise, the matter was put in practicable shape. Some three thousand dollars, to pay expenses, premiums, &c., were raised by subscription, (mostly from the butter and cheese dealers of New York,) in addition to a fee of two dollars to be paid for each entry. Letters were published and circulars sent all over every dairy section, urging factories to exhibit; but the feeling of uncertainty prevailed to such an extent, that factorymen generally were very loth to exhibit on their own responsibility, and had it not been for the enterprise of the dealers and our Board of Trade there would have been but *very few* exhibits, and, practically, no dairy fair. Most of the goods exhibited (I refer more especially to the cheese) were bought by dealers and our Board of Trade, and exhibited and entered in the name of the factory or salesman. The fair was held in the American Institute building, and was pronounced a grand success, and yet if one was disposed to criticise, there was abundant opportunity to do so.

The addresses were interesting, instructive, and well received. Attendance good throughout. There was a very large display of dairy apparatus. Messrs. Whitman & Burrell, of Little Falls, New York, and Messrs. Jones, Faulkner & Co., Utica, New York, had each a complete outfit of factory and creamery apparatus. Had their factories in operation, (made cheese and butter,) for several days during the fair, to the great delight of the "green city people."

There was a fair representation of milking stock, consisting of Jerseys, Ayershires, Holsteins, Devons, and Natives, and one "Sacred Cow," which was neither an object of utility or beauty, but simply of curiosity. I do not know the number of entries or of articles received of the various kinds; but of cheese and butter I should think there were in the neighborhood of one thousand packages of each, aside from the special exhibits of Messrs. Thurber & Co., and Messrs. Smith & Underhill. New York, Pennsylvania, the Northwestern States, Ohio, Michigan, Indiana, Illinois, Wisconsin, Iowa, Missouri, and Canada each had cheese. New York and Pennsylvania had larger exhibits than any other States. New York and Iowa were largely represented with butter. Several other States had small amounts.

One of the finest exhibits of the fair was the large pyramid of cheeses contributed by Messrs. Thurber & Co. It comprised samples of all the different kinds of cheese made in this country and Europe. Around the base were a number of cheeses that weighed seven hundred and fifty pounds each, and near by was one that was said to weigh nineteen hundred pounds. This exhibit was said to have cost $5,000. Facing this pyramid, and near by, was another of about the same size, exhibited by Messrs. Smith & Underhill, arranged by Mr. Ingram, containing some five hundred cheeses, mostly from Wisconsin and Vermont.

While the quantity of cheese exhibited was very creditable, the quality, as a whole, was far from being fine. But few of the reputed fancy factories of New York State were represented at all. Quite a large per cent. of the New York exhibit was "part skims," considerable of the rest (New York exhibit) was brought in by the dealers to fill up space, and not numbered or labeled at all. New York did not do herself or the occasion justice. The goods from each State in class H, were exhibited and judged separately and by different judges, but upon the same "scale of points," which was a modification of Professor Arnold's, fifty being the maximum of perfection, instead of one hundred.

But you are most anxious to know about our own exhibit, and in order to give a full understanding of the matter, it is important that I take it up at its begining. Our own locality sympathized with the prevailing opinion, and it became necessary, in order to be represented, for somebody to purchase the goods. Accordingly the Board of Trade being determined not to be behind other localities in enterprise or public spirit, resolved to purchase the goods, and make the exhibit; and in accordance therewith your speaker was appointed a committee to select and purchase five cheeses from each of, at least, twenty factories, and, if practicable, a representation of creamery butter, and make the exhibit. When I received definite instruction about the proper course to take, it was late in the season. The weather and roads were bad; which, to say the least, made it very unpleasant getting about much of the time. I visited as many factories as I could, (some thirty,) and got eighty-two cheese and nine packages butter promised from twenty-six factories and two creameries. Five factories made their own selection. Making in all thirty-two entries, (one hundred and nineteen cheeses and nine packages of butter,) entered and paid for; but four of these factories and one creamery failed to send their goods at all. Another parcel (West Union) was shipped, but did not arrive in time. Another parcel (skelton's) was shipped all right but by some means got mixed in with the exhibit from some other State, and could not be found during the fair. So that, though we made and paid for thirty-two entries, our exhibit was only twenty-two entries, (eighty-eight cheeses and five packages butter.) The Warner, Cole, and Edinboro' factories receive the first, second, and third premiums. Standing respectively forty-nine, forty-eight, and forty-seven points of perfection. The other fourteen factories exhibited by the Board of Trade stood at forty to forty-six, excepting one thirty-nine, one thirty-six, and two thirty-two, showing a *good* average, much better (I was informed) than the exhibit from any other State. New York had nothing in her general exhibit as fine as several of our lots. I have not been able to ascertain the standing of our special exhibits.

Each State was allowed to enter its parcel that had received the first premium, to compete for the sweepstakes prize, or all might, if they preferred, enter parcels that had not been entered in class H, (New York State did this.) England took the prize on cheese that was made in June. I was informed that Canada stood next, New York third, Pennsylvania fourth. I am satisfied that had some of our cheese been as old as the English exhibit, it would have stood close up to it. In fact one objection urged byexperts who examined our exhibit, was that some of our parcels were not sufficiently cured, though made in August. Our exhibit attracted a great deal of attention, and very favorable comments from exporters and dealers in New York and elsewhere. I believe it was universally conceded that ours was decidedly the best exhibit in class H that there was on exhibition. No other State had, as a whole, anything equal to it. All of the New York State judges in class H—Prof. Arnold, Mr. Thos. Bamber, and Mr. E. H. Burrell—freely admitted that our exhibit was much finer in quality than theirs; not in quantity as they probably had twice as large an exhibit as ours. Prominent exporters, dealers, and experts were surprised and pleased with the quality of our goods, and many flattering comments were made. The New York papers gave them many very favorable notices.

I cannot say much favorable of our exhibit of creamery butter, as we had not much there, only one creamery represented, and that one Mr. H. W. Canfield's. I do not know how it was rated, but I understand it was pronounced fancy, and, of course, received the first premium; and I do not regard it as being very creditable to the butter interest of this section that but one exhibit was made from Pennsylvania. It suggests to me that there must be a wide field for improvement in this direction.

As progressive dairymen, what are we to learn that will be of practical benefit to us in the future? Are we to conclude that because whenever we have exhibited our goods (more especially cheese) in competition with other and older dairy sections, we have disappointed our competitors, experts, and even ourselves with the fineness of our productions, that we have reached the acme of perfection in our art, and henceforth have nothing to learn? No intelligent, practical dairyman will say this. What then? Far be it from me to desire to discourage any laudable ambition for improvement, or to wish to detract anything from any individual or section of his or its legitimately obtained laurels.

My friends, I am one of your number, and have only what I conceive to be the best interests of our common cause at heart in what I do or say, and have a just pride in the growth and prosperity of our great interest. Therefore, will you listen to a word of warning from me. At the Centennial, at Chicago, at Erie, and at the International Dairy Fair our goods were universally well received, and in every case, I believe, very highly complimented by expert judges, which, so far as it goes, is just cause for pride and encouragement. But do not be too much flattered by this, for does it ever occur to you that in all these instances the goods were mostly selected by men who understand full well the demands of the trade, and (with the exception of the last exhibit) were selected by our best judges, who selected not only fine goods but those uniform in quality, and undoubtedly in most cases the very best we had, while in most other localities there has been no concentration of effort and the goods have generally been selected by the factorymen, each one having a standard of his own, so that there would not be the uniformity in their goods as when one or two persons selected the whole. What we want is not alone that we may be able to excel our competitors at fairs, which is all right as far as it goes, but we should secure a uniformly fine production and thereby be enabled to always obtain top prices. We want our goods known in every great dairy mart of the world as being uniformly fine. It is a fact well known to dealers who are at all familiar with our goods that such is not now the case. The very fact that when we make an effort to show fine goods exporters, dealers, and other experts are so much surprised, is sufficient proof of this. Besides, we have another proof that comes nearer home, which is the prices we get. Not that we haven't any number of factories that produce fine and fancy goods, under favorable conditions; but we have not a single factory in this whole section that any dealer would feel safe to order, from week to week, during the whole season, at top prices. There are any number of such factories in other localities. This is a very unpleasant feature for us to consider, but if it is true, (and who can refute it) let us look it squarely in the face and seek for the remedy. There must be one, if we only can find it, and will apply it. To say that we will not do this is to go back on our reputation for enterprise, as manifested by our Association and Board of Trade, and also in our recent "new departure," viz: procuring the services of one so able and widely known and generally recognized authority on dairy matters as Professor Arnold, to give us practical lessons and familiar lectures upon the subject in which we are all so deeply interested. And for the benefit of those who may not know, allow me to say that his instructions are producing their legitimate results, as was clearly demonstrated at the late fair by the fact that every sample of cheese that was recognized as being the finest, was made substantially after his method. I speak advisedly.

Lest some one may think that I mean to convey the impression that there has been no improvement in the quality of our goods, I wish, most emphatically, to deny any such intention. I think no such thing; I know better. It is not that we have made no improvement, but it is in the fact that there is room for more, and we need to take advantge of it.

I have, in this sketch, only made an effort to glance at some of the facts and circumstances of the fair as they appeared to me, and our relation to the same as dairymen, and, by the way, hinting at some of our merits and defects, without attempting any suggestions for obviating the latter, a work which will be more fitly left in your hands.

Pennsylvania Cheese on Exhibition.

J. Cole,	6
William Nash,	6
J. W. Irons, Findley's,	6
E. E. Eighmey, Owens' Corners and Beaver Centre,	10
P. Crane, Edinboro',	5
William Warner,	5
I. W. Allee,	5
H. C. King, Spring Valley,	5
Grifling & Tisch, Linesville,	5
D. H. Nodine, Cochranton,	5
H. Williams, Woodcock borough,	5
A. H. Yaple, West Green,	5
A. H. Bates, Penn Line,	5
H. Hammond, Dicksonburg,	5
J. G. Holman,	5
William Marsh, Branchville,	5
A. B. Skelton,	6
G. W. Carroll, West Union,	5

WESTERN DAIRYING.

By Prof. GEORGE E. MORROW, *Dean of Illinois College of Agriculture.*

The phrase "western dairying" is an indefinite one. A Vermont dairy farmer might think it appropriately applied to the dairy interest represented by this Association; pretty certain would use it in reference to the dairy interests of Ohio. An Iowa man might restrict it to Kansas and the further west. As used in this paper, it will refer mainly to dairy farming and manufacturing in Illinois, Wisconsin, and Iowa; more strictly speaking, it may be said to apply to only parts of each of these States, for, in much the larger part of each of the three, dairying, in the modern use of the word, is scarcely known. What are called the "dairy regions" in these States, are the northern third or quarter of Illinois, the eastern portion of Wisconsin, and the eastern half of Iowa. Cheese and butter are made outside these divisions; but the mass of the cheese, especially, is made within them.

The rapidity of the development of the associated dairy system in this country is one of the most interesting of all the marvelous growths of our agriculture; but especially has this growth been rapid in the West. An interesting bit of history is given, which seems to give grounds for the claim that the origin of the associated dairy system was in Wisconsin, instead of New York; in 1841, instead of 1851, and by Mrs. Picket, instead of Jesse Williams. Mr. J. G. Picket asserts that on June 1, 1841, and through the summer, he assisted his mother in making cheese from the milk of thirty cows, owned by six "patrons;" the milk being carefully weighed and credited to the owners of the cows, and the cheese made being divided in the fall. The milk was delivered by the simple expedient of driving all the cows to the yard near the "cheese factory," which was the kitchen of a log-house, and there milking them; but the first factory regularily established for cheese making in these States is believed to have been near Elgin, Illinois, and erected in 1862. In 1867, the Illinois and Wisconsin Dairymen's Association was organized, and it was claimed there were then thirty-five factories in those two States. One little county in Wisconsin now has some sixty-five cheese factories, using the milk of over ten thousand cows.

Unfortunately, it is impossible to give, with any approach to exactness, statistics of the present production of cheese and butter. Mr. Hoard estimates the cheese production in Wisconsin, in 1878, at twenty-five million pounds. More than thirty million pounds of cheese were received in Chicago during the year. The sales at the Elgin Dairy Board of Trade approached seven million pounds. Sheboygan county, Wisconsin, shipped three million eight hundred thousand pounds, although some of this was manufactured in adjoining counties. It is practically impossible to give an estimate of the butter production.

Large as the present annual production is, the dairymen of Pennsylvania are much more interested in the question, what are the *prospects* for western dairying? And I shall attempt to give a fair statement of the present condition, and the advantages and disadvantages of the West for competition with the more eastern States in dairying.

Some disadvantages, which formerly had much influence, have been removed. Ten years ago and less, there was a general feeling that no part of the West was well adapted to the dairy, and that but little was even passably well-suited for this branch of agriculture. With this feeling was associated the idea that western dairy products were necessarily of inferior quality. These beliefs have largely passed away. It has been demonstrated that a very large area in each of the three States named is well adapted to the dairy business, and the same might be said of other western States. Competitive tests have shown that, both in butter and cheese, it is possible for "the West" to produce articles fully equal to the best of eastern products. That the mass of western butter, and much western cheese, is of inferior quality, will be readily admitted by any intelligent westerner; but the proportion of really good goods is steadily increasing. The awards at the recent dairy fair in New York, as also in Philadelphia, in 1876, clearly indicate that it is possible to make first class butter and cheese in the West.

At the request of your Secretary, I have had sent you samples of creamery butter from each of the three States of which I am writing. I have not seen these, but accidents excepted, I am willing to stake the reputation of our western butter on your verdict on these samples. Butter from the creameries of Messrs. Sherman & Co., of Iowa; Newman & Thompson, of Illinois; and George Lawrence & Son, of Wisconsin, won prizes at the late dairy fair at New York. The samples now sent were made under more unfavorable circumstances. I have also had a package sent you from the creamery of Messrs. Wanzer & Miller, of Knox county, Illinois, to show the product of a region south of what is called the "dairy region" of the State, and one in which dairying is quite a new industry.

Lack of knowledge concerning the business was formerly one of the most serious disadvantages under which our dairymen labored. Not entirely removed, this trouble is much less felt now, as there has been, through dairy associations, and periodicals and books, and inspection of each other's work, a remarkably rapid diffusion of information, not only among manufacturers, but also among dairy farmers. As a rule, the western dairy associations have been well sustained. Next week the North-western holds its thirteenth annual meeting, at Chicago. I have no information of any western association connected with agriculture which has been so well sustained for so long a series of years, or which has more closely adhered to its legitimate work, or done more good to the class for whose benefit it was organized. The Wisconsin State Association has just held its seventh annual meeting, and these have continuously grown in interest and importance. The Illinois Association is but five years old, and the Iowa still younger, but each is vigorous and flourishing. Only last week, the "Eastern Illinois Dairymen's Association" was organized, with a good degree of enthusiasm, and other associations of more local character are well sustained.

A real disadvantage is in transportation to eastern or European markets. The transportation charges are but very little higher than from points much further east, but transportation for so great a distance tends to injury of condition. Facts show, however, that this tendency is much less strong than would have been supposed.

Some things formerly believed to be disadvantages have not so proved themselves. Thus, the general absence of "running streams" is believed to be almost, if not entirely, a desirable condition. Wind-mills pump good water from comparatively shallow wells, over very much of the West, and many farmers will strongly insist they would consider it a positive disadvantage to have a stream running—or standing, as would often be the case on prairie farms—on their lands. In one or two considerable regions, notably in eastern Illinois, flowing wells are easily obtained.

The belief that grasses well adapted for dairy cows could not be produced in most of the West, has been shown to have had no foundation. In fact, the famous " blue grass " thrives as well over a large part of the West, as in Kentucky, which has, oddly enough, given its name to this most excellent grass, unsurpassed with us for late fall or even winter pasturage, and scarcely equaled for early spring use. Timothy, (*phleum pratense*,) and the clovers, find a most congenial soil and climate, and if not of the best quality for the dairy cow, they are very fair and make some amends for lack of the highest quality by their abundant yields.

We of the West have learned, in common with you of the East, that a considerable variation in climate may be permitted and yet dairying be pursued with good results. One of the very best dairy regions of the West, judged by the continued growth and prosperity of the interest, as well as by the uniform excellence of its products—mainly cheese—is Sheboygan county, Wisconsin, which reaches well up to the forty-fourth parallel of latitude or say as far north as the south of Maine. I have seen and eaten of excellent butter in southern Illinois, or say as far south as Washington, District of Columbia.

Probably the greatest advantages which western dairymen have in comparison with their eastern friends are to be found in the lower prices for their lands, fixtures, cows, and feed. I do not believe it is sectional pride which leads me to the conclusions that these things outweigh any or all disadvantages. Taking the entire region in which the dairy now occupies a prominent place in the farm interests of the West, thirty dollars per acre would be a full valuation for the land. To-day corn will average not over twenty-five cents per bushel in the same regions; with other cattle foods at proportionally low prices. Hay is worth not more than seven or eight dollars per ton. Lumber for buildings and fencing is correspondingly lower than in the East. Coupled with these facts are the others that these lands are not cheaper because less fertile; but, on the contrary, as a whole, will produce more of grain or grass per acre than will those of the eastern dairy regions. It must be admitted the West has a decided advantage.

The actual doing of a thing is a more effective proof that it can be done than is any amount of argument to show that it may be done, and so the best argument as to the fitness of much of the West for dairying is to be found in the facts that those engaged in this line of farming have had unusual prosperity, and the business has steadily and rapidly extended year after year. I have frequently stated in public that no class of western farmers, of equal number and capital, have made equally large profits for a series of say fifteen years as have the western dairymen. This statement I have not known to be opposed. In an address before a western dairy association, something over a year since, I had occasion to point out that equally large profits were not to be expected in the future, the near future, at least. This statement was received with some criticism, but the experiences of 1878, have sustained it to even a greater degree than I had anticipated.

You are familiar with the eager, often angry discussions of what we called the "farmers' movement." Probably no class of our farmers took less part in these than did our dairymen. While grain growers and even meat producers were showing the oppressiveness of the transportation charges, and other exactions, the dairy meetings, as a rule, were devoted to discussions as to modes of manufacture, etc. It would be idle to deny that this has largely changed. There is now very considerable dissatisfaction among our dairy farmers. The philosophic content themselves with the reflection that they have done as well (or better) during the last year as have their neighbors; but many are complaining that their work has brought no adequate returns. In some places excited meetings have been held to secure more favorable terms from the manufacturers, and at these it is declared by some that they will "go out of the business" if no concessions are made. At the recent meeting of the Wisconsin Dairymen's Association a resolution was adopted favoring the plan of delaying the commencement of cheese manufacture in the spring to a date considerable later than usual.

These things are noticeable because they are new in our dairy business. There is no reason to believe that the depression in western dairying is more severely felt that in the East; but those directly interested in either section will do well to give careful attention to the situation.

In the older and best known western dairy regions of the West, as that about Elgin, Illinois, Kenosha, or Sheboygan counties, Wisconsin, I do not expect further enlargement of the production for some time to come. Probably there will be a considerable increase in the milk shipments to Chicago; perhaps, to St. Louis. Probably, a considerable number of farmers will reduce rather than enlarge their herds.

Over against these facts are to be set these: In many regions in which the dairy interest is comparatively new, there is quite a general feeling that it offers better returns than grain growing for sale, or even grazing cattle. In sections of Illinois and Iowa, in which grazing beef cattle has been the most prominent agricultural industry, there is now decided tendencies to change to dairying. Keeping this in mind, I anticipate an increase in the western butter and cheese crops—mainly from the extension of associated dairying into new regions, where it will be made a part of the general farming, rather than so exclusive a specialty as it has become in some parts of the West.

Among the effects of the lower prices for cheese and for the higher grades of butter during the last year, I count one favorable one to be a marked stimulation to consumption. Hence, I look for an increased home demand. It has seemed to me our western dairymen have not done all they might to develop this home market. It is favorable to you of the East that there is so large a population in the west and south-west which should be largely supplied with dairy products from the West. Our cities and towns are growing in population, and the consumption of both butter and cheese is yearly increasing. Large as is the area in which dairying is prominent, it is but a comparatively small part of the whole West. Three fourths of the counties of Illinois and Iowa import cheese.

But, certainly for years to come, there will be a large surplus of both cheese and butter to export to the east or to Europe. The average quality of the exported article will continue to improve, and I can see no reason to believe the western dairyman will stand, all things considered, at a disadvantage with his competitor. I do not expect the West to drive the East from the business, but I do believe it will always be able to successfully compete with the East in either the American or foreign markets. Of the two, it seems to me butter making will be less affected with you than will cheese making.

Unquestionably, Illinois cheese has suffered in reputation from the common practice of making skim-cheese. Wisconsin has done less of this, and the reputation of her cheese is correspondingly higher. So far as my information extends, a large proportion of the new factories are designed for making both butter and cheese. There is an increasing number of private dairies in which high grade butter is made. The western demand for such butter is increasing. The practice of "winter dairying" is extending, and is believed, with good management, to be the most profitable. I am inclined to the belief that the lower price of food has led to heavier feeding of dairy cows than is the rule at the East. Corn is largely used, of course, generally, in connection with some other grain.

The dairy cows, as a class, will compare favorably with those of the East. In the vicinity of Elgin, Illinois, and to some extent throughout northern Illinois, the Holstein or Dutch cattle are now quite popular. A very few Ayrshire herds are in use. The Jersey is undoubtedly growing in popularity as a butter cow, and the results from grade Jersey herds, in at least a few cases, have been remarkably good. Still, the great mass of western dairy cows owe their excellence rather to skill in selection than to purity of breeding. Much the larger number have some Short-Horn blood.

Of the dairymen it may be said, those of the north are largely the sons or younger brothers of the easter dairymen. Those of the southern part of the western dairy region, have come largely from Pennsylvania or Ohio. As a body, they will compare very favorably with any other western farmers in intelligence, enterprise, and industry. Their prosperity in the future, will, at least, equal that of any class engaged in farming in the West.

I have preferred to speak mainly of the three States with whose dairy interests I am best acquainted. It may be said that there is a marked increase of interest in the business in Indiana, and that Minnesota and Missouri are steadily growing in importance in this direction, and that in the States, and even the Territories further west, the dairy has made a good beginning.

SOILING AND ITS ADVANTAGES TO DAIRYMEN.

By Col. O. O. POTTER.

The most prosperous dairyman keeps none but the best cows, provides for them an abundance of the best food, plenty of pure water, comfortable quarters, diligent care, and undisturbed quiet.

Given these data, coupled with the highest skill in the management and manufacture of the milk, and a ready market, with remunerative prices, will always await the product.

By what methods can these requirements be fulfilled with the greatest certainty and at the least expense? My unhesitating answer is, by the system of soiling or stall-feeding.

How have these requirements been heretofore fulfilled on the present system of pasturing? How are they likely to be fulfilled the ensuing season, and in the future?

First, then, let us inquire what is the general character of the pastures throughout this region. So far as my observation has extended, they consist largely of the waste places of our farms, the slashings, the half-cleared, wild, back bush lots, half timber and half covered with brush heaps, decaying logs, briars, brambles, undergrowth of every description, rank weeds, and wild grass, with more or less of what would have been sweet grasses, had light and sunshine been permitted to reach them, unimpeded, with their sweetening influences; or some old range, rough, rocky, and worn, where the civilizing influence of the plowshare has never reached, and where, year after year, perhaps for generations, overstocked, a hungry herd has grubbed and starved until the grasses have given way to the beautiful moss, wild vines, and noxious weeds, which now hold chief possession, while the struggling grasses make feeble and futile attempt to maintain the unequal contest; and if kindly nature maintains a stream of running water through this desolation, the poor beasts will return daily thanks for such an infinite blessing, but if the herd is compelled to depend solely on pools of stagnant water, the horrors of the situation are multiplied, and their prison-pen recalls those other ghastly horrors of recent history. These descriptions outline a very large percentage of our dairy pastures, and the dairymen who provide such food, water, quiet, and comfort for their herds are generally the greatest grumblers.

It is the milk thus produced, bearing the frequent aroma of some noxious weed, unwholesome herbage, or foul pool, that taints the pure product of careful patrons, injures the reputation of the factory, and reduces the dividends of all concerned to a minimum.

But even take the case of a model pasture, where the best grasses abound in all their varieties, with abundance of shade and pure running water,—a very paradise for cows—do we realize what a large percentage of the rich herbage is utterly lost as food by pasturing? How much is ruined utterly, how much injured, and the growth seriously retarded by the trampling hoofs of the herd—how much buried beneath the droppings, which, wherever they fall, blot out so much for that season? Who has not observed, thickly dotting our pastures, the circles of rich, rank grass left uncropped, and which stock cannot be induced to touch, solely from this cause? And these dark green spots of wasted verdure are not of this season's origin, but of the previous one, or the season before. So, too, those spots, where they lie down to rest, are avoided, until the dews and rains have washed and an added growth has freshened and sweetened it once again. Driving a distance to and from their pasture is often positively injurious, heating and thereby tainting the milk. So when they are compelled to travel a distance for water, in addition to these objections is that of frequent suffering from thirst, especially when their patience and strength is exhausted in unceasing labor to secure a bare subsistence upon poor pasture. How often the herd leaves the pasture for the milking-yard, suffering from this cause, is known only to themselves. After a day passed grubbing to eke out a wretched existence beneath a hot sun, tormented by the sting of swarming flies and other insects, and then driven to the yard, suffering the additional torment of thirst, and that unrelieved save by the cooling shades of night and the falling dew, but a mere moiety of the possible milk secretion can be realized, and that of the thinnest, poorest, and tainted quality.

These and a variety of other causes tending to the discomfort and disquiet of the herd, reducing quantity and impairing the quality of the milk to an unrealized, an unknown degree, are the unavoidable consequences of the present system of pasturing, rendering satisfactory returns impossible, however skilled and careful may be the manufacturer. Causes which seem to us "trifles light as air," produce tainted milk, and tainted milk means poor cheese. A single can of such milk may taint the entire product of the day.

The time has come when dairymen must heed the lessons of experience and the teachings of their progressive and thoughtful fellows. Falling markets and sharp and intelligent competition admonish us that the greatest skill, the wisest economy, and the most unflinching energy is necessary in order to fight our way to the front in the business, and hold our position there.

Until within a very recent period we thought ourselves safe from any competition from the West, but those vast agricultural empires, heretofore almost exclusively grain-growing and stock-raising, are invading our specialty, are "plowing with our heifer," and have already proved dangerous rivals in the dairy markets. Owing to the wicked discriminations in their freight traffics of the great trunk lines of railroads against us, the West is enabled to reach the seaboard with this product, as they always have done with their grain and stock, at even a less cost than we can reach the same point with our own, and the quality of their goods demonstrates that the West can, after all, make butter and cheese. While touching upon competition as an incentive to dairymen to seek and adopt the best methods, I cannot forbear reference to that very singular competition in the dairy markets, that monster of unnatural birth, generated by the shiftlessness and shortcomings of generations of producers. Oleomargerine, rises before the astonished eyes of men, and like the poor, tired ghost of Banquo, will not down at their bidding, but defies, sneers at conventions, their *resolves*, and their protest, and even the shafts of the law-making power fail to reach its vitals. How to rid the world of this King of *Grease* doctors differ, but as he owes his origin to bad butter, I am sure that to deprive him of his natural element would be to rid us of his presence.

Thus we have entered upon an era of vast production and sharp competition until but recently never dreamed of by the dairymen of this and adjoining States. What shall we do to meet this exigency? Shall we "throw up the sponge" and retire from the business in disgust? Or, knowing as we do, that in the past, as Hosea Bigelow has it,

> "We've only turned our cuff's up; but to put her thru,
> We must git mad and off with jackets tu."

This region is adapted to the dairy as a specialty, and to no other branch of agriculture in that degree. The dilemma has but two horns for us, viz: "Stick" or go West, my man, go West. In every other department of agriculture the competition and overproduction is just as great, and the odds overwhelmingly against us, because our soil and circumstances are not so thoroughly adapted to them as to the dairy. The only way out of "the woods" is to settle down to business, and resolve to do our "level best." And what is the best thing to be done? I answer, having procured a dairy of the best cows, provide for them an abundance of the best food, plenty of pure water, comfortable quarters, diligent care, and undisturbed quiet. This can be done by no method, with so much certainty and economy, as by the system of soiling or stall-feeding throughout the year, for the reason, that when we cut the food ourselves, and place it before them, green, sweet, and succulent, we are perfectly certain both as regards quantity and quality. That green fodder crops can be raised and utilized so that we may be able to keep double the number of cows, I presume no one will dispute. Because a soil enriched and especially prepared for this purpose, and sowed to choice forage crops, will produce at least double the food and generally much more than double the quantity produced by ordinary pastures. The fodder crops, which experience has proven to be most valuable, furnish food throughout the season not less sweet and wholesome than the best of pastures in the flush of feed. Winter rye can be depended on for a cutting in May, early or late that month, according to the character of the season, followed by clover, orchard, blue, or June grass; this again by the second cutting of the rye, for this crop furnishes several cuttings during the season; then a crop of oats; barley is also said to be an excellent fodder crop; so is millet, Hungarian grass, and sorghum. Corn should be sowed or drilled. I prefer the latter.

Every two weeks, until the last of July, a crop of early sugar beets to be fed; after the first frosts turnip, beet, and mangel tops; a supply of cabbage at this time will be duly appreciated and promptly paid for in milk; then roots until May again. This last item, it is found, is sadly neglected by dairymen generally. Roots may not decrease the consumption of hay or other food during the winter, but a peck per head once a day keeps the stomach and bowels in good working order, and prevents the hide from sticking fast to the ribs. These crops will furnish cows with rich and juicy food for all the year, and especially during the season when it is most important that they should have the very best food.

One square rod a day per head is about a fair average. One acre, then, will furnish green fodder for a single cow five months or one hundred and sixty days, and I am assured by practical men engaged in practicing this system, that three fourths of an acre for summer soiling and one and a quarter in hay and grain for winter soiling is ample; all agree, who practice soiling, that two acres per head is sufficient. How many acres are required per head by our present system of pasturing to keep a cow through the year? I estimate the minimum at four acres, or twelve head to fifty acres. The average, however, for this region I believe to be not less than six acres per head, or only eight head to fifty acres. Change your method, put this fifty acres into cultivated crops, and it will keep twenty-four head better than it now keeps twelve or even eight. Cows thus fed in clean, cool stables, darkened sufficiently during the heat of the day to protect them from flies and other insect pests, with airy sheds and well arranged yards attached in which to take their morning and evening exercise after milking, with plenty of pure water in convenient shape, intelligent dairymen, who have given it a thorough trial agree, will produce fifty per cent. more and fifty per cent. better milk than by the ordinary method of pasturing. A difference of fifty per cent. suggests an income of thirty dollars per head instead of twenty, or sixty dollars per head instead of forty. For a herd of thirty cows it means an income of nine hundred dollars instead of six hundred dollars, or by the high estimate, which ought to be the just one, it means an income of eighteen hundred dollars instead of twelve hundred. But to carry out this soiling system successfully, we must have manure, and how we are to get this is an important question. We might continue to do, as many of us are doing now, purchase commercial fertilizers, but that is expensive. Better make it in the barn-yard, if you can; good barn-yard manure is good enough for me. Let us see, if by soiling we may keep double the number of animals, we can double the quantity of manure. By our present system, we stable about half the year; during the other half I maintain, as I have suggested, that the manure is even worse than wasted. By the system I advocate, it is saved throughout the year. Moreover, from the character of the food and the manner in which it may be saved and utilized, the value is greatly increased. Hence, the saving of manure alone is an advantage in favor of soiling of vast importance. Let us not forget that not only here, but everywhere, barn-yard manure is the foundation of agricultural success.

Another and very great advantage in favor of soiling, is the saving of fences. By this method the necessity for fences would no longer exist, save only a yard of sufficient size for the daily exercise of the herd.

It has been estimated that the fences of this Commonwealth have cost more than the present value of its real estate, and I doubt not, that the estimate is at least approximately correct.

The method which I advocate is no innovation upon the present system of summer feeding; it is something more; it is revolution. The first step has already been taken, in a feeble way. Partial soiling, in connection with shrinkage of pastures, has become the method of every dairyman, and the benefits of such a practice are too evident to be questioned. The preparations for such extra feeding should be more extensive and thorough. The feeding should commence earlier and be practiced more liberally.

And when the days shall have come that burn with fervid heat beneath the dog star's fiery reign, permit our patient friends to enjoy the cool retreat of a cool and dimly-lighted stable, the hospitalities of an airy shed or other grateful shade. Let the mowing machine do the work of cropping their clover for them, place it before them fresh, sweet, and luscious, and in their quiet asylum; they will look their thanks and repay you with a foaming flood of sweet, untainted milk.

Professor Arnold says "that only twenty-five per cent. of the cheese received in New York, is classed as fine."

Seventy-five per cent., then, of the vast product of the country is selling below, and much of it far below, the highest figure; and this means a dead loss of millions of dollars in a single season to the dairymen of the country. Are the profits of the business, I ask, so great that we can afford to throw away a few millions annually?

We cannot look for the best prices unless we furnish the best goods. These cannot be produced unless the best material is furnished. Milk of the best quality is produced only by a combination of the most favorable circumstances. The cow must be thrifty in condition, her food must be abundant and sweet, water pure, and the atmosphere she breathes, without a taint. In short, some degree of cleanliness is essential at every stage.

There are people who cannot see dirt, or realize the existence of filth in any moderate degree, of whom it cannot be said that their personal habits are akin to godliness.

I cannot think that this class of people have ever been "called" to the duties of the dairy. With this class, small, I trust, but very fairly and evenly distributed through the community, rests the responsibility of the seventy-five per cent. of poor cheese which floods the market.

Professor Arnold says, "to much sun heat produces tainted milk, and tainted milk means poor cheese; I care not who the maker may be." This cause of taint is avoided by soiling. Again, he says, "I often find cheese offered in competition for prizes that has been ruined in flavor by carion taints which have been inhaled with the breath of the cow. This comes of leaving dead carcasses to go to decay in your pastures uncovered." This may be avoided by soiling. In short, soiling, with a little care, is a certain specific for the whole family of taints, and of all the other ills which milk is heir to.

PROF. L. B. ARNOLD'S METHODS AND THEORIES OF CHEESEMAKING.

In my report for 1878 I gave a detailed account of the visits of Prof. Arnold to the cheese factories of Northwestern Pennsylvania, during that season.

The degree of interest manifested by those who gave thought to the subject, and the diverse opinions that prevailed among cheesemakers and others, in regard to the practicability of some of his leading ideas, led to his return, in June of the present year, to repeat his visits and renew or continue his instructions.

He had made a similar visit to Canada, with similar results.

An extensive and somewhat bitter controversy took place through the dairy papers of Canada and the States, and there seemed to be no alternative left Prof. Arnold but to repeat his visits, correct his mistakes, if any were made, modify his methods to accord with further experience, and prove himself master of his profession, or stand under the imputation of being an impracticable, visionary enthusiast, an unsafe guide.

As he taught some novel theories and recommended practices hitherto believed to be impracticable and inconsistent with common sense and common experience, it was to be expected that grave questionings should follow him closely.

The vast interests at stake, and the admitted fact that the science of cheesemaking, even among the best factories, was, to say the least, crude and imperfect, and productive often of very unsatisfactory results, seemed to warrant a further and fuller test of the new methods.

After the second series of instruction, the diversity of opinion seemed as great as before, and when a sufficient length of time had elapsed for the curing of cheese and proof of the qualities of the product of the new method, it was deemed advisable to call a meeting for the special purpose of hearing reports from those who had followed the new methods, more or less fully, on the success and degree of satisfaction or disappointment resulting therefrom.

Accordingly, this subject was made the special order for two successive meetings of the Pennsylvania State Board of Trade, on August 19th and 26th, and invitations were extended to those who had such practical knowledge of the workings of the new method to report thereon.

It is but fair to state that the reports, as a whole, bear strong testimony to the value of the innovation, and if they do not prove the new method to be the perfect method, they stamp it as a progressive method that may be tried with comparative safety, and that is eminently worthy of a trial, at least in some of its leading features, by every cheese-maker who is not already satisfied with his own attainments.

REPORTS AND DISCUSSIONS ON PROF. ARNOLD'S TEACHINGS AND PRACTICE.

BOARD OF TRADE, TUESDAY, *August 19.*

Meeting called to order by Vice President JOHN COLE.

President FINLEY arrived and took the chair at the opening of the discussion; but was compelled to leave on the train before the close of the meeting.

H. C. GREENE stated that as the special order for the day was to be reports of those who have adopted the Arnold system, he hoped those reports would be made as explicit and full as possible. It was desirable to ascertain to what extent different persons have adopted the new plan, and with what measure of satisfaction.

Mr. LEWIS. I would gladly uphold the hands of Prof. Arnold, for he has given us valuable information. He stated to us that, by his plan, "he could turn out just as good cheese from tainted milk as though it was not tainted." We tried the experiment ourselves, and followed his instructions. When our curd was fit to draw the whey, it was in a sad plight. We did our best with it, and the result was a cheese that Mr. Bigger pronounced good.

Mr. SQUIRES. I have found the new plan to be almost a perfect success Prof. A. came to see me last season, and while I didn't jump at once upon his plan, I feel very well pleased with the result. I find it takes but little longer to get the curds to press than by the acid plan. The sample I have here was made of pretty bad milk on the 3d of August. I pay little attention to acid, whether I have it or not, and salt three pounds to the one thousand of milk, varying the quantity from time to time according to the dryness of the curd. I find the new plan perfectly safe in almost any case. Though I aim to draw the whey when the curd will squeak between the teeth, yet the time of drawing is not so essential as by the old method. Prof. Arnold visited me about a year ago, and since that time I have been getting more and more reckless as to the details of the operation. In one case my milk was so sour that it thickened while I was stirring in the rennet. The result was a fair cheese, as tested by several buyers, and was not rejected in the market. In fact, I have had no rejections this year. I had some rejections formerly.

Mr. **BIGGER.** Mr. Squires has told us that he is having good success now, but he has not told us that he is one of the few cheesemakers who started out a success from the first. The fact is, his locality is highly favored with good pasturage, and it was for this reason, in part, that Mr. Farrington and I selected Townville as the point to build a factory. The quality of feed has much to do with the quality of cheese.

Mr. **FERRY.** I set at ninety, cut the curd in about forty-five minutes, and salt at three pounds, and aim to draw my whey sweet. My June cheese show fine keeping qualities, and are scarcely cured yet. I find this plan excellent in using bad milk, as you draw the taint away with the whey. I cure the curd thoroughly until it becomes very stringy. I have had no rejections since adopting this method. I commenced cheddaring about June 1, and have sold about half our cheese made since then. They have been sold at home.

Mr. **COLE.** What are we to understand by cheddaring?

Mr. **FARRINGTON.** Cheddaring is simply the drawing off the whey while sweet, letting the curd cure while packing in the vat, and using the curd mill to reduce the curd before salting.

Mr. **BIGGER.** I was told by Mr. Irons, who learned to make cheese of Mr. Hardin, in England, that Mr. Hardin did use acid, and if his curds were too sweet he used to turn in sour whey to introduce the acid.

Mr. **FARRINGTON** insisted that when Mr. Irons came from England, he knew nothing, whatever, about working with acid, and that all he knew of the acid plan he had learned of him when in his employ. He alluded to the practice of Alex. McAdam in cheddaring ten years ago, as a great success.

Mr. **WEBSTER**, of Horr, Warner & Co., reminded him that Alex. McAdam, who has been for several years in the employ of his firm, has for six years discarded the use of the curd mill entirely.

Mr. **NODINE** asked permission to test the sample of tainted milk cheese in the room as it was nearly train time and he must go.

Mr. **NASH** read the following letter from Messrs. Thurber, relating to his July cheese of 1878. A portion of his shipment was exported to Spain, each cheese being placed in a tin box for transportation. The result was an order for more of the same kind, which they were unable to fill.

NEW YORK, *August 8, 1879.*

WILLIAM NASH, Esq.:

DEAR SIR: By request I report to you the condition and keeping quality of your cheese sent to us last December for sale. A portion of your July cheese (marked A) we kept until March, and then sold them for shipment to London. We found them solid, close made, and clean in flavor. They showed better keeping qualities than many of the September cheese we had in store. The time is not far distant when the cheese makers will be compelled to make a longer and better keeping cheese. The great bulk of our cheese coming to market in hot weather is made, by the forcing process, to mature in twenty and rot in forty days. Such cheese cannot be held; must be sold on arrival, which has had a tendency to greatly depress our market; being ready for the knife when they are received, must be sold regardless of price. It is conceded by all that England cannot consume our great make of June, July, and August as fast as they can be made, and their being pressed upon the market so rapidly (when they are not wanted) has driven the market down to the very low figure now current. Manufacturers should make long keeping cheese during the three months of glut, in order to more evenly distribute the crop as wanted.

H. K. & F. B. THURBER & Co.

J. B. **PHELPS.** I have always made cheese on the acid plan, and was well aware that I was making sometimes a good article, and sometimes an article that I was not proud of. So I resolved to get all the benefit I could out of Prof. Arnold's teachings. He took one vat and I the other at my factory. I was surprised at the appearance of his curd, but the result was such that I have followed his plan since with satisfaction.

I set at ninety degrees uniformly, and uniformly draw my whey at a certain time of the day, and I defy any one to find in my factory an imperfect cheese. I salt three to three and a quarter pounds, according to the quality of curd. Prof. A. regarded the high salting as a very important item in his method. My cheese give me no trouble by cracking, unless I have left my curds too long before pressing, or neglected my head cloths.

To insure the closing of the curd in pressing, it must be pressed before getting too cold.

Mr. **FERRY.** I think if the curd be sufficiently cured in the vat it will close without any trouble.

Mr. **FARRINGTON.** Professor Arnold does not claim the credit of originating this plan, in the main, but only that he has discovered the reasons why it is preferable to the old method of cheese making. The practice of packing and grinding curds has been common in England for fifty years.

Mr. **WYKOFF.** At my factory, Professor Arnold advised to heat the milk to ninety degrees, apply the rennet so as to begin to coagulate in twenty-three minutes. In fifty minutes he cut the curd, then heated the curd in about three quarters of an hour to ninety-eight. The whey was somewhat stale when drawn. The result is, I am making a better and more uniform cheese than on the old plan.

Mr. **KING.** I made, last season, partially on the Arnold plan, and my cheese seemed to be fine and sold well.

Mr. **PHELPS.** I favor this plan chiefly because by it the whey is drawn and separated from the curd before it takes on those changes that tend to injure the curd, whether those changes come from acid or from taint.

Mr. **FARRINGTON** described the old sweet curd process of making home-made cheese, and the difference between that and the acid process, and also the present cheddaring process.

J. G. **HOLMAN.** We used to make cheese by the old process, and carry our cheese till fall, but we never heard any complaint of off flavor in those days. We made perfectly sweet curds, as a rule, and I am in favor of it yet, but if the market requires an acid cheese, we have to make it to suit the market.

Mr. **PHELPS.** I do not want it understood that, because I have found a better way to manage bad milk, I am going to take bad milk if I know it. I shall criticise my milk just as closely as before, and send back all sour or tainted milk I find.

The time occupied by the preliminary discussion on American cheese in England consumed the time due to this discussion, so that it was left in an unfinished state. In fact, the important point of *what constitutes the gist of the new practice* was not clearly drawn out. "The attorney in the case," seeming to be more concerned to establish the acceptability of Professor Arnold's teachings than to show exactly what those teachings have been, manifested no little impatience with criticisms offered, and a remarkable aptness to "rise to explain." Let the gentleman rest assured that his client is not on trial for life, nor has the court either the disposition or the power to imprison.

The subject was postponed for one week for want of time, and it is to be hoped that no further objections will be urged to the use of specific terms so commonly used by the Professor. There is more in exact facts than in terms.

Two cheeses were shown, which were said to have been made of milk badly tainted. The one from Townville factory was only partially cured; but showed no bad flavor. The other, from John Brown factory, was fully cured, a close made, compact cheese, and of good flavor.

A piece cut from the first cheese made by Prof. Arnold in this county this season was shown by Mr. Farrington. This sample was decidedly of bad odor and flavor, weak, somewhat open, and a trifle wet in spots, being under cooked and under salted. While curing it appeared very soft and puffy; but after forty days it settled down with a good external appearance.

TUESDAY, *August 26.*

This session convened with Vice President **COLE** in the chair. The Board occupied the new council chamber for the first time, and were highly pleased with their new quarters.

DISCUSSION ON THE ARNOLD METHOD.

J. L. WYKOFF. Mr. Arnold instructed me to draw the whey sweet. I attribute my better success in securing good flavor to the better handling of my curds under his system. The present season has been more favorable to flavor and keeping qualities than last. I salted two parcels of the same curd; one parcel at three pounds and four ounces, and the other at three pounds and fourteen ounces. The lighter salted is the best cheese to-day. I draw my whey sweet. Sometimes acid forms during the packing process, sometimes not. I find but little difference in the result, whether it takes on acid or not. I heard it reported that the John Brown factory had been noted for bad flavored cheese before I went there. I had the same trouble last season. The present season I have secured better flavors.

Considerable time was consumed in irrelevant talking, "rising to points of order," personal sparring, &c., which, while it tended to add spice to the occasion, would scarcely be interesting to the reading public.

Mr. WYKOFF. The whey should be drawn at a point when the curd is considerably firm, but, if possible, before the acid forms in it. I have drawn it when the curd was very soft, and made a fine cheese, still I prefer to have the curd somewhat solid, and free from whey. I do not consider it necessary to have any acid to make fine cheese.

M. P. LEWIS, of Warner factory, reported by letter:

WARNER FACTORY, *August 26, 1879.*

I follow Prof. Arnold's plan to some extent. Think it a safe plan for the warm weather. Let the curds stand in the whey until they show some signs of sticking to the hot iron; then draw the whey quickly. Have no curd mill. Keep the curds fine with the hands until ready to salt. Do not let them get quite as dry, nor salt quite as heavy as the Professor did.

The following table will show the number of pounds of milk, the number of pounds of cheese, when taken from the press, and the number of pounds of cheese when sold. (They were all sold at the same time.)

Commencing with the 3d of July, the day that Prof. Arnold was here:

	Milk.	Curd.	℔s Milk per ℔ Cheese.	Cheese when sold.	℔ Milk per ℔ Cheese.
July 3, ...	4,090	379	10.79	360	11.3
July 5, ...	4,000	390	10.25	368	10.8
July 9, ...	3,990	388	10.28	367	10.8

There is no danger of getting sour cheese if you draw the whey sweet, and I have no trouble with puffy cheese. Yours, &c.,

M. P. LEWIS.

JOHN FULLER. In my factory Prof. Arnold made a cheese in June of last season. Heated the milk to 98°, added the rennet, cut the curd, went around the vat three or four times, stirring the curd and let it settle. In three fourths of an hour he drew the whey with two siphons, and let the curd pack in the vat. The cheese sold as rejections at five cents, while the cheese made by the ordinary method at my factory at that time brought eight cents. We considered the rejections well sold. It was apparent that Prof. Arnold underwent considerable of a change during his visit here, and before his return this season. As near as I could learn, he did not follow the same plan at other factories as he did at mine. This is the ground of my cautioning cheesemakers against adopting Prof. Arnold's teachings. But it seems that this season the Professor has modified his theory and practice, so that he is now, in my opinion, pretty nearly on the right plan. I I have offered any man fifty dollars that would produce a good marketable cheese, following the instructions and practice of Prof. Arnold, at my factory, and the offer is good to-day.

Rev. LEWIS, of Blooming Valley factory. I am not much of a cheesemaker, and do not expect ever to become very closely related to the cheese interest here. I wish to explain my remarks of a week ago, for I have been charged with being unfair in my statements, though for my life I cannot see wherein. This is a question of acid or no acid. Prof. Chandler, high authority, says that while rennet is not acid, it has the power to produce acid, and in the curing process of acid into cheese, acid does certainly form, as we all know. We all know, also, that acid is a dangerous element to use in excess in cheesemaking. One Fourth of July morning, our boys wishing to enjoy the holiday, and not daring to trust the old gent to make the cheese, hurried the process at every stage, and made a perfectly sweet curd, but it turned out a fine cheese.

Mr. LEWIS, junior. I am now drawing my whey sweet; considerably sweeter than in the early part of the season. When I grind my curds, the whey appears to be sweet. I have not tried it with the hot iron when ready to press, but while grinding it does not respond to the hot iron test. I think an excess of salt tends to dryness, and cracking. My cheese crack but very little. I judge of the readiness of curd for grinding, by pulling it apart and noting its fibrous appearance. The longer the curd lies packed, the finer the fibers appear.

Rev. LEWIS. I believe that in all cases curd will take in acid on the curing process. Sooner or later the acid must be formed. When the whey is drawn sweet, the curd seems softer than when the whey is drawn sour. In salting, I pay more attention to the dryness or sweetness of the curd than to the question of acid or no acid.

W. N. GILBERT. Prof. Arnold, as we all know, condemned our common practice as compared with his own. At my factory he took charge of a curd which was well under way when he got there. The change introduced by him was not satisfactory in results. His limited instructions I cannot follow and get a curd sufficiently compact. I have to get a mere trifle of acid to suit my ideas of firmness. My opinion is that we need the action of acid, to some extent, to give us the best results.

Mr. COLE. I remember that, when the old Prince Albert potato was being introduced, there was a sharp controversy between growers as to its proper name. Some insisted that, in honor of Governor Clinton, it should be called the Clinton. Now, it seems to me, there is something of that disposition shown here. Whether we call it acid or digestion, or whatever we may name it, we know what the result is that we aim at, and what we want to know is, which is the best means to secure that result. We want to hear less quibbling over terms, and look for cause and effect.

We print the following letter from Mr. J. W. Irons, a native Englishman, who learned to make cheese in the dairy of Mr. Harding, the oft-quoted and justly famous maker of the genuine English cheddar cheese. This fact is, of itself, sufficient to render the letter of interest to cheesemakers. No man has been referred to more frequently as authority on cheddar cheese making than Mr. Harding. We here see, as plainly as it can be written, just what his practice was:

ATLANTIC, CRAWFORD CO., PA., *August 22, 1879.*

Mr. J. M. BIGGER:

FRIEND BIGGER: I note the discussion which took place at the Board of Trade last Tuesday, relating to Professor Arnold's system, sweet curds, acid system, &c., &c.; and since my name is connected in two opposite phases of the argument, "I rise to explain," especially, seeing that this thing is being drawn down to such fine points, as regards terms used. In the first place, this sour whey business is substantially as you put it, with this difference: I don't remember of Mrs. Harding ever putting in sour whey after the milk was set, but she always set the milk herself, and almost always, right in the heat of summer, put in from one to two or three quarts of sour whey; it was always set at eighty-two degrees, cut in about sixty minutes, after the curd was thoroughly broken up it was heated to one hundred degrees, then worked for half an hour; the whey was then drawn off, and the curd allowed to pack in the bottom of the vats till it had taken on the right amount of acidity, (or, as we are now taught to call it, digestion,) then torn up in pieces, put to press, taken out and cooled, then ground, salted, and pressed. I have heard Mr. Harding express the want of an acid meter, whereby he could determine, to a certainty, the exact amount of acidity in the milk or curd; he used as an experiment blue litmus paper.

I am well aware that, when Mr. Farrington first employed me, I knew nothing of the American system of ripening curds under whey. We paid little attention to whether we drew the whey sweet or slightly acid, as long as they were thoroughly worked; but we did desire an acid developed before grinding. Mr. F. must have forgotten how we used to test, by smell and taste, the heart of a lump of curd; also, that our surest test of the right amount of acidity was the taste of the whey as it drained from the curd; we desired it to have a distinct taste of sour milk. Mr. F. alludes to Alex. McAdam as making sweet curds. One thing I do know, as regards Mr. James McAdam, is that he used acid. I stayed with him for one week. He always put in or had put in about one pailful of sour whey to a vat of milk. What impressed that upon my mind was that one morning he told a green hand to do so, and he put it in before there was much milk in the vats, and curdled what there was.

Now, while differing from Mr. F. in the terms used in regard to cheddar cheese making, my experience has taught me that the nearer we keep to the *true cheddar system*, the more reliable and uniform will be our product, and that the further we depart from it, the more uncertain and unsatisfactory.

I duly thank Mr. Farrington for what he taught me about cheese making on the American acid plan, and also thank him for teaching me to test curds, (cheddar included,) by the hot iron. He then taught me that the strings produced *showed the amount of acid.* I believed it then, and have seen no reason to doubt it since.

Reading of rejections, I am reminded of a gentlemen north of here, otherwise a first class maker, who experimented last summer on seventy-five cheese. They went forward, were rejected, sold for four and a half cents, while others were selling at from six to seven cents.

I am yours truly,

J. W. IRONS.

The foregoing reports, remarks, and discussions in relation to the new departure in cheesemaking, would be relatively pointless and wanting in force, unless accompanied by a more definite and comprehensive statement of the theory on which it is based.

A very complete and intelligible statement of the theory and methods of Prof. Arnold, as taught and practiced by him at the close of the season of 1879, is the following from the able pen of the secretary of the American Dairymen's Association, Mr. T. D. Curtis, of Utica, New York.

Description of the Process.

HEAT.—The milk is received in the ordinary vat in the ordinary way, and then gradually heated to the temperature of ninety degrees before the rennet is added. The customary way is to set the milk at eighty-four to eighty-six degrees. The new methed prefers the higher heat because the liquid is more readily and more evenly heated than a solid is. The temperature of ninety-eight degrees, or blood heat, would be preferred for the same reason, but experiment shows that the rennet does not produce as good results at ninety-eight degrees as at ninety degrees, but they are better when the setting is done at ninety degrees than when it is done at a lower temperature. After the curd is cut it is allowed to stand until sufficiently hardened to permit of stirring without waste. Then the temperature is steadily raised at the rate of a degree in two minutes, to ninety-eight degrees. Here it is kept, as nearly as circumstances and facilities for keeping up the temperature will permit, until the end is reached. But a slight fall of temperature, or even its gradual descent to eighty degrees does no damage to the curd, if it does not sour. It simply retards the action of the rennet and delays the time of going to press. Unless the milk is sour or too far gone with age the curd is not allowed to remain in the whey long enough to sour. Where acid comes on before the whey is separated special treatment is required.

SETTING THE MILK.—This, as before said, is done at ninety degrees. Prepared rennet, of uniform strength, is preferred. It is better to mix the concentrated liquid—one pint of which is sufficient for thirty-five hundred or four thousand pounds of milk—in about one gallon of water at or a little above the temperature of the milk, for every pint of rennet used. This secures an evener action of the rennet throughout the mass of milk than could be secured if it is added to the milk in the concentrated form, no matter how much it is stirred. It is readily distributed evenly through the water without affecting in any way the virtue of the rennet; but when in the concentrated form it strikes the milk, some of its virtue is expended upon the milk first touched, and this coagulates a little in advance of the mass, making denser points all through it, as can be seen by putting the hand in the curd and permitting it to run off gradually as the hand is raised. These points get too much rennet action at the expense of the rest of the mass. Hence the advantage of diluting the concentrated liquid rennet in water. The stirring to incorporate the rennet should be continued—agitating the whole mass, and not merely ruffling the surface, as some do—until the milk will barely have time to come to rest before coagulation begins. The strength of the rennet being known by actual experience, a good judge of the condition of the milk can easily approximate the time at which coagulation will begin. He will, of course, avail himself of any doubt, and stop stirring soon enough not to spoil the curd. If he uses enough rennet to cause coagulation to begin in fifteen minutes he is safe in agitating the mass of milk for twelve minutes.

CUTTING THE CURD.—Under the old method, there is no definite rule for cutting the curd. It is an advantage of the new method that it furnishes a definite rule, in no way depending on contingency or guesswork. The operator may be deceived in the strength of the rennet, if it is a batch he has not carefully tested, and get a coagulation sooner or later than he desires. He proportions his rennet to the time he wants the cheese to cure and keep. If he wants it to keep a long time, he uses a proportionately less amount of rennet, which will require more time in which to perfect the cheesing process. If he wants a quick curing, short-keeping cheese for immediate consumption, he adds a larger amount of rennet. The day we spent with Prof. Arnold, he wanted to make a rather quick-curing cheese, and put in rennet enough to cause the beginning of coagulation in a little over eleven minutes. Had he wanted a fairly slow-curing and long-keeping cheese, he would have had the point of coagulation at twenty minutes or longer. And here, after these explanations about proportioning the amount of rennet to the character of cheese desired, comes in the rule for cutting. No matter how soon or late the coagulation begins, the time intervening between that and the setting is multiplied by two and a half, and this gives the time after setting when the cutting should be done. For illustration: the day we were with Prof. Arnold, coagulation began in a little over eleven minutes; he cut the curd twenty-eight minutes after setting. Thus, two and a half times eleven are twenty-seven and a half, and, making allowance for the time over eleven minutes when coagulation began, made twenty-eight minutes from the time of setting the milk. If coagulation had begun in twenty minutes, the cutting would have been done at the end of fifty minutes. This makes a rule that every one can comprehend; but it requires a timepiece and strict attention to business. It is valuable, however, as everything definite about as empirical an art as cheese making helps to reduce it to a science, and enables us to secure uniform and reliable results. The cutting, when begun, should be continued with tolerable expedition until finished, and the cutting should be what is called " fine "—quite fine.

The object in cutting is to facilitate the escape of the whey from the curd, and hence the finer it can be cut without waste, the more the escape of the whey is facilitated. The day of what was called " coarse curds," long since passed, except among a few fossils who never change, and all intelligent dairymen now concur in the practice of fine cutting.

Stirring the Curd.—With the process of raising the heat begins the stirring, to not only prevent the packing of the curd on the bottom and around the sides of the vat, where the heat is greatest, but to secure an even distribution of the heat throughout the mass of curd. Some, but not so many as formerly, think it necessary to begin the stirring and breaking of the curd with the hands. Once there was no cutting of the curds, and all breaking was done with the hands. Even since the days of associated dairying and dairymen's conventions, some leading dairymen have inveighed against the use of the curd knife as dangerous and wasteful. The same class maintain the use of the hands in the first stages of stirring the curd, and oppose and denounce the use of the rake as likely to "make white whey." But they are honestly mistaken, and stand in their own light. The rake, at all stages when it is safe to stir the curd, will do it more easily, more expeditiously, and more cleanly than the hands. It is disgusting to see perspiring men and women working in the whey up to their shoulders, and painful to see them nearly breaking their backs reaching across the edge of the vat. They may be, and are quite likely to be, more destructive and wasteful than the rake. Professor Arnold uses the rake from the beginning until the whey is drawn off. All the stirring done in the whey is done with the rake, and a smooth hand hay rake, with about one half the handle cut off, is as good as any. The stirring, after the heat is up to ninety degrees, does not need to go beyond just sufficient to keep the curd from packing and gathering in large lumps, which will not readily take the salt, when salting time comes.

Drawing the Whey.—Formerly a portion of the whey was drawn off as soon as the curd acquired sufficient hardness to not run through the strainer. Enough was left to float the curd easily, and this was kept on until sufficient acid was developed to make the curd fit to dip. Then there were great hurry and commotion to get the balance of the whey off and the curd dipped and salted before it got too sour. But sometimes the acid developed so rapidly that it would get the start of all hands, and the curd would be more or less injured by too much acid. Gradually it became the practice among cheesemakers to draw off all the whey as soon as there was any indication of souring, and cheddar the curd—that is, haul it away from one end of the vat, elevate the other end, and then part the curd in the middle, lengthwise, piling it up along the sides of the vat, so that the whey ran off and settled in the lower end as fast as it exuded from the curd. This is now the prevailing method, the hot iron being depended upon to indicate the degree of cheesing or acidity, whichever it may be called, by the number and length of the threads of toasted curd that can be drawn out when the hot iron is applied and adheres to it. When ready, the curd has to be ground in a curd-mill before salting. The new method draws off the whey early—as soon as the curd is hard enough to prevent all waste—and keeps the curd from packing and lumping by stirring with the hands until it reaches the point where it will not pack, so that it cannot be readily crumbled apart by stirring and using the hands; and it is desired to avoid all necessity for grinding, while the hot iron is considered useless as an indicator of condition. But here comes in a contrivance for facilitating the separation of the whey and keeping up the temperature, while making the work of stirring easier and aiding in " oxygenizing " the curd.

THE RACK.—Something like the old-fashioned sink rack is placed in the bottom of an empty second vat. One extra vat, in place of the usual sink, would answer for a factory, as the first vat is emptied in transferring the curd to the second, and the vat just emptied can be used as a second vat or sink for the next one. But let us describe one or two peculiarities of this rack. It is made in two, three, or four sections, as may be chosen for convenience of handling. The slats, an inch or an inch and a half wide, run crosswise of the vat, and are placed so as to nearly touch each other. Of course, they are as long as the vat is wide. These are nailed to side pieces, running lengthwise of the vat, and placed four to six inches from the sides. These side pieces are half or three quarters of an inch thick when planed, are ten inches wide, and stand up edgewise, thus causing a space of ten inches between the lower side of the slats and the bottom of the vat. These side pieces are supported by one or two braces on each section of the rack, near the bottom, but not so as to obstruct the passage of whey under them. The side pieces are ten inches wide, not only for the purpose of leaving considerable space below the curd, as it lies on the rack, but so as to raise the rack high enough to make it convenient to stir the curd on it with the hands. If permitted to lie too near the bottom, the reaching would be tiresome, and even painful. On this rack is spread an ordinary cheese-strainer, and then the curd, with as much whey in it as is left when the siphon stops drawing, is dipped and emptied in this cloth and rack. Of course, the whey drains through and occupies the ten-inch space beneath. This whey is not only thus easily gotten rid of, with the whey remaining in the curd as fast as it exudes, but aids in keeping up the temperature and in keeping it even and not too dry. This heat is not so essential to making a good curd as it is in hastening rennet action and expediting work. If, in cold weather, it is likely to get too low, steam is turned on, and the temperature of the whey is raised, which warms the curd by radiation. In ordinary summer weather no additional heat will be needed.

OXIDATION.—Here we have to consider one of the principal points of the new method. It has for some time been known that to let a curd stand in the open air, with occasional stirring after salting, appears to improve the texture and flavor of the cheese, and many of our best cheesemakers practice airing the curds as much as possible in this way. But none of them, so far as we know, have tried the experiment of airing curds before salting. Under the new method, the early drawing of the whey, and spreading it on the rack we have described, is for the purpose of airing or oxidizing the volatile oils in the curd. These form gases by oxidation while curing, and, if they form gases faster than they can escape freely through the rind of the cheese, cause porousness and huffing, so much disliked by all. But exposing the curd to the air by stirring it on the rack, while it helps get rid of the whey, also oxidizes the volatile oils and gets rid of them, while such as are not volatile, but remain to give flavor and richness to the cheese, are progressed in the process of curing to an an advantageous degree. In cheddaring, this oxidation is greatly facilitated, and hence the advantage of this method over that of keeping the curd in the whey, where little or no oxygen reaches it, save as it is brought to the surface by stirring. Aside from this, there is a positive disadvantage in leaving the curd in the whey and excluded from the air.

This exclusion of the air facilitates fermentation, or the development of the yeast fungus. There is not only decomposition, but recomposition by the action of organic forces. It is when this action begins that it is so difficult to get rid of the whey, and salt the the curd before it is injured by acid. The avoidance of this fermentative action is what gives the cheddaring method its superiority. All who have tried cheddaring know that it greatly, if not entirely, avoids the danger of too much acid, unless it be by mis-judgment. But the new method does not want the acid development at all in the curd, and seeks to avoid it. It aims at simple chemical changes, by breaking up old combinations and forming new ones. Two agents only are recognized—rennet and oxygen—and these are relied upon to produce only chemical changes, such as breaking up some combinations and forming others without developing organic action. The rennet gradually destroys the cohesive power of the atoms of casine, and prepares them to unite more closely with the new compounds formed by the fats and oxygen. The casine has no positive flavor of its own, and, without the proper chemical union with the fats, which the rennet prepares the casine for, and the oxygen prepares the fats for, it is practically indigestible and innutritious.

By the oxidation of the fats, carbonic acid gas, as well as other gases, is thrown off; and the union of the oxygen with these fats is what gives the distinctive cheesy flavor. When this flavor is attained, it is desirable that the oxidation should go no further. Beyond this, decay is gradually approached, and is indicated by the rank "off-flavor" taste, which grows stronger and stronger, until putrefaction is reached. The rennet action is chiefly digestive, and should keep pace with oxidation. When the culminating point of both is reached, we have the best flavored and most digestible and nutritious article of cheese. Whoever discovers a method of stopping the action of both rennet and oxygen at this point will confer a boon not only on the dairymen, but on mankind, and stand a fair chance of reaping a handsome reward.

SALTING.—With the new method, it is not so particular when the salting is done, provided the milk is all right to begin with, and there are no signs of fermentation. It is usual with those who adopt the new method, to let the curd air until about ready for the press, before adding the salt. At first, the curd steadily hardens as the whey separates, until it feels quite hard and harsh; but gradually, as oxidation goes on, after the rennet has expelled the whey, the curd softens, and grows smooth and silky to the touch. It also grows tenderer, and gets quite mellow, apparently becoming richer in flavor and appearance, or showing more "quality," as the buyers say of cheese when it is fine and buttery. When the proper degree of softness is reached, or the cheesing and oxidation are progressed far enough—to determine which is a matter of observation, experience and judgment—the curd is salted, and, if cool enough, is put to press. In hot weather the curd should not be pressed at a temperature much above eighty degrees; but in cooler weather, if the temperature of the press-room is not kept up, eighty-four to eighty-five degrees would not be an injurious temperature. Unless the surrounding atmosphere is quite cool, so that there is considerable escape of heat by radiation, the temperature of the cheese will rise after it is put to press, owing to the combined action of rennet and oxygen, and the center of the cheese will be warmer than the outside, because curd is a poor conductor of heat, and the heat generated will but slowly pass off by radiation. The temperature of a curd in the vat or on the rack may be raised somewhat by allowing it to remain quiet, so the heat will not radiate into the atmosphere. The salting should be at the rate of two and a half pounds to one thousand pounds of milk.

TAINTS.—It is claimed for the new method, that by oxidation the taints in milk can be wholly got rid of; and that even the flavor of onions, leeks, turnips, rank grasses, or other strong-flavored food can be dissipated into the atmosphere—as all these flavors and smells depend on volatile oils which pass through the cow's system into the milk, and are oxygenized and expelled in the form of gasses by exposure on the rack. The thorough separation of the whey from the curd as fast as it exudes, also facilitates the escape of the elements of taint. Hence, in working tainted milk, the process of oxidation is prolonged until the taints disappear; but should there be danger that fermentation will set in, the curd may be salted, and afterwards exposed to the atmosphere, the salt not hindering the action of the rennet or of the oxygen, but checking the development of the acetic acid. Lactic acid may be had by simple oxidation without fermentation, which should be prevented, if possible, and checked as soon as possible, should it set in. Floating curds and slippery curds are improved by oxidation before or after salting. They are always tainted curds.

SOUR MILK CURD.—When the milk is so far gone that souring cannot be prevented, it should be set at a low temperature, and not heated beyond ninty-four degrees. But the cutting and separation of the whey should be expedited in every way, and the salt, in extra quantities, got on as soon as possible. If some is thrown into the milk before it is set, and stirred in with the rennet, it will be an advantage, as the sole effect of the salt, beyond flavoring, is to check fermentation and retard decay. It may safely be used freely on sour curd, because thrown on early, and much of it is carried away by the whey, which will hold it in solution. If a curd is very sour, it may be washed by pouring warm water—say of one hundred degrees to one hundred and five degrees—over it while stirring it, and improved thereby..

CURING.—There is nothing peculiar about the curing process under the new method, save that it continues its philosophy in the curing-room. The temperature should be even, and should be sixty-five to seventy-five degrees, according as more or less rapid curing is desired. Here the oxidizing process, which was put ahead of the cheesing process in the make-room—in order to volatilize all offensive oils, and expel them in the gaseous state—needs to be held in abeyance, to give the rennet a chance to do its work. Too much ventilation is not good for a curing-room, if cheese is properly made, so that offensive gases will not be generated. It is impossible to prevent further oxidation, at least in the ordinary curing-room, but it can and should be kept down to the minimum point until the cheese is fit for market. It must go on so slowly that the small amount of gases generated may find escape through the rind, and not cause the cheese to puff, or show its former presence in excess, in the form of holes, big or little, when the cheese is bored or cut. Nor should oxidation be rapid enough to generate too much heat, and cause fermentation to set in, as the yeast plant will prey upon the caseine, and form out of it a compound neither palatable nor profitable; and this fermentation with the rapid oxidation of the fats will soon form a compound of decay and low organism, unfit for human food.

COLORING.—We have, thus far, said nothing of coloring, because, on the day that we took our first lesson in the new method of cheesemaking, Prof. Arnold was making cheese for himself, and used no coloring. But we got his views on this subject, which, as may be inferred, were not favorable to putting coloring matter into cheese. He says the addition of the vegetable matter used for coloring slightly affects the flavor, and is an element of fermentation and decay. If used at all, it ought to be cut with oil instead of alkali. All coloring for cheesemaking is dissolved in potash. The alkal unites with the coloring, but when put into the cheese the alkali finds a stronger affinity, in the casein, and unites with it, instead of with the fats, as some have supposed, while the annotto forms new combinations with the fats and oxygen; both sets of new combinations making a bad flavor, and hastening decay.

The following brief record of the organization of the American Dairymen's Association deserves a place in this volume, and will be read with interest by all who appreciate the value of organized effort in developing the dairy resources of America.

The credit of inaugurating a new era in cheesemaking is due not less to the parent society than to the founder of the factory system, Mr. Jesse Williams.

THE AMERICAN DAIRYMEN'S ASSOCIATION.

The first dairy organization in the world, of which we have any knowledge, convened at Rome, New York, January 6, 1864, when the representatives of sixty-nine factories assembled to report their transactions during the previous season, and to compare practices, with a view of adopting and giving publicity to the best. Of this meeting, Jesse Williams, the originator of the factory system, was made president, and B. F. Stevens, of Lewis, and George W. Pixley, of Oneida, secretaries. This was one of the most important assemblages that ever convened in the interest of agriculture. It was an initial step toward adopting, on a larger scale, of more than national extent, an organized system of mutual aid and instruction, with a view to improvement in what has, in consequence, become one of the largest industries in the country. One of the prominent purposes of the convention was to review the results of factory cheesemaking in the summer of 1863, and hence its transactions are recorded as covering that date. But more than this was done. On the second day of the convention, a New York State Cheese Manufacturers' Association was formed, with more than a hundred members, and appropriate officers elected and installed. Of this organization, George Williams, son of the distinguished Jesse Williams, of Rome, was made president, and William H. Comstock, of Utica, secretary. The purpose, which was held prominently in view in the formation of this Association, is well expressed in the preamble and resolution heading the articles of association.

WHEREAS, It is deemed expedient to organize an Association through which, as a medium, results of the practical experience of dairymen may be gathered and disseminated to the dairy community; therefore,

Resolved, That we, the undersigned, do hereby associate ourselves together for mutual improvement in the science of cheesemaking, and more efficient action in promoting the general interest of the dairying community.

The convention adjourned to give place to the association, which held a short session, and adjourned for a year. The meeting for 1865, which was held in Utica, January 12 and 13, was an immense gathering, and was even more interesting and important than its predecessor. The first recorded address was delivered at this meeting by X. A. Willard, of the Utica *Herald*. It was an elegant, able, and comprehensive paper, doing credit to its author, and good to its hearers. The discussions took a wider range, and efforts reached out for information from wider sources. The reports of factories were more full and complete; a list of factories for convenient reference and address was collected, and placed in the report; and the subject of sending an agent to Europe to collect information upon dairy matters was discussed. The spirit of enterprise, which was now fully awakened, was not satisfied with a single annual meeting, and an auxiliary meeting was held February 1, at Watertown, at which eloquent and instructive addresses were made by Messrs. Comstock, Williard, Bartlet, of Ohio and others, and the State organization changed to national, or a rather international one, embracing Canada in its scope, and giving it the name of "American Dairymen's Association," which it still wears.

The discussion in regard to sending an agent to Europe was revived and approved, and Mr. X. A. Williard was selected as the man. At the second annual convention of the Association, W. H. Comstock, Esquire, of Utica, was elected president, and Gardner B. Weeks, of Verona, secretary. The latter held the position with credit to himself, and usefulness to the Association and the dairy public, till 1874. Mr. Comstock declined holding the presidency a second year, and Mr. George Williams was induced to accept for another term, when ex-Governor Horatio Seymour, of Utica, was elected in his place, and occupied the position till the meeting in January last, doing, by his financial aid, his personal exertions, and his great name, valuable service to the Association, and to the great interest with which he thus became identified. After doing duty as secretary since 1874, L. B. Arnold, of Rochester, New York, was elected to the place made vacant by the declination of Mr. Seymour, and T. D. Curtis, of Utica, one of the ablest dairy writers, both practically and theoretically, in America, was made secretary to fill his place.

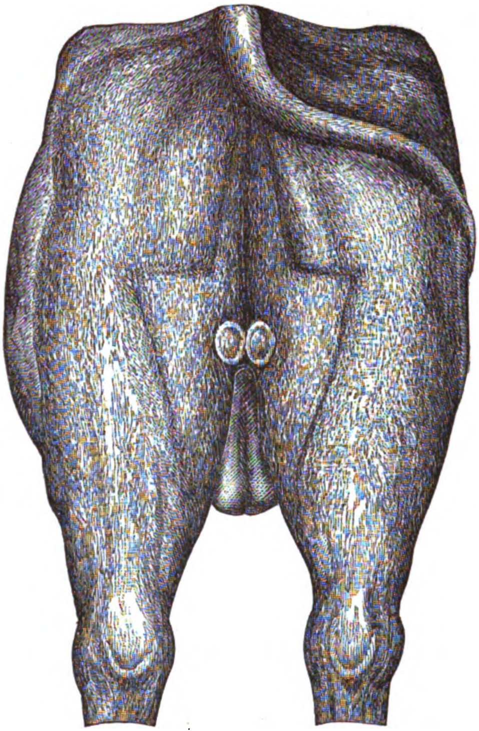
Under the leadership of these several officers, the American Dairymen's Association has accomplished a vast deal of work, which has made its impression upon the whole dairy interest and country. It has not often held more than one convention yearly, and these have been for the most part held in Utica. It has held two in Rome, one in Philadelphia, one in Canada, one in Cleveland, Ohio. It has published, including the two under the name of New York State Cheese Manufacturers' Association, sixteen large reports, numbering from one to two thousand copies, which have gone into circulation, and been read and quoted all over the world, and it has been a medium for circulating a vast amount of information besides, through the correspondence of its secretaries, which has always been very large. There are now few agricultural libraries which do not contain copies of its reports for reference, and the demand for them is unabated, but can now be only partially supplied, as several of the numbers are exhausted. The interest in these reports has never abated, and the last one, just issued by Secretary Curtis, is full of matter interesting and valuable to all connected with dairy farming.

In its first meetings the Association confined its discussions to the mechanical processes of cheesemaking, but its scope of discussion has steadily enlarge till it has embraced the whole field of dairy husbandry, from the location of a dairy farm to the consumption of dairy products. It has grappled with all the difficult problems of the art, and if it has not done all that could be desired, it has, at least, done much toward making the business of dairying a science as well as an art. It has inaugurated a system of discussion and investigation which has spread all over this country and Canada, and has taken a foothold in Europe. It has created and developed a dairy literature which is still rapidly expanding, and which is unequaled in any other country in the world. Its members have been drawn from the leading and most skillful and practical men in the industry, and its speakers are numbered among the most eminent and learned scientists in the country. In the work it has undertaken it has been efficiently aided by influences external to itself. The press has always favored it with its encouragement and powerful aid, and the sister associations which have been born of its influence and example, in all parts wherever dairying has any prominence, have taken upon themselves the work of pushing similar efforts, and their influence has given an efficiency to the original impulse which has given it an extension and potency which no single institution could alone accomplish. In unison with these associations, it is still laboring, and proposes to continue on, so long as there is occasion for its labors

BIOGRAPHY OF PROF. ARNOLD.

Lauren Briggs Arnold, was born in Fairfield, Herkimer county, New York, August 31, 1814. His father being a farmer, his early days were spent as most farmers' boys were spent at that time. In his twentieth year he commenced teaching, which he continued with slight interruption for thirteen years. In his twenty-fourth year, he entered Fairfield academy, where he prepared a class of young men for teaching, in the meantime keeping up his full studies. He left at the close of the term to teach, and on his return to the academy, he was made assistant instructor in mathematics, in which he was especially proficient. At the age of twenty-seven, he entered the third term of the junior class at Union college, where he was honorably graduated in the class of 1843. In 1844, he accepted a position as assistant professor of mathematics in Fairfield academy. His aged father being suddenly taken ill, he was recalled home to attend to the ancestral farm. Dairying interested him particularly. Here he began the studies, practice, and experiments which he has since conducted with so much interest as to render great service to the dairymen of his own country. The results of his studies have been sought after, and utilized in other countries. His literary pursuits were not neglected while engaged in active duties of the farm. He made physiology, animal and vegetable, and agricultural chemistry subjects of reading for years. His reading covered all branches of agriculture, but more especially the dairy. He, in 1859, had charge of the agricultural department of the *Mohawk Courier*, published at that time at Little Falls. His editorials on the dairy were widely copied. In 1860, he contributed to the *Dairy Farm*, a continuation of the *Mohawk Courier*. He mixed but little in politics, but was elected three times a supervisor of his town. In 1861, he moved to Tompkins county, where he in 1868, returned to the dairying business, building a factory on his own farm, buying his milk of the surrounding neighbors, which, together with the product of his own farm, gave him full liberty to investigate and experiment at his leisure.

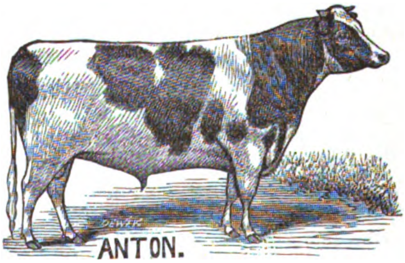
In 1869, Professor Arnold gave at the Dairymen's Association, an essay on animal odors, which, being somewhat new, caused much comment. In 1870, his essay on cheese as an article of food, took the prize awarded by the American Association, and was highly commended by dairy writers generally, and had a wide circulation in both this and foreign countries. In Russia, it was sold in pamphlet form. In the same year, 1870, he became dairy contributor to the *New York Tribune*, which position he still holds. In 1873, in addition to his work on the *Tribune*, he assumed the editorial department of the *Canada Farmer*, which he continued one year. He has lectured many years, in both Canada and the United States. In 1876, he published his first book, "American Dairying," which continues to grow in favor with the dairy public. In 1876, at the Centennial Exhibition, Professor Arnold was elected a juror on Group 4, embracing the dairy, for which he was awarded an honorary medal. He has the past year been making many experiments. He has been a monthly contributor to the *Farmers' Advocate*, of Canada, for a number of years. In 1874, he was chosen secretary of the American Dairyman's Association, which position he filled with honor until 1879, when he was elected president of the Association.



HOLSTEIN BULL "WOUTER."

Imported by Edgar Huidekoper, Meadville, Pa.

Showing escutcheon and roses or thigh ovals.



HOLSTEIN BULL "ANTON."

Imported by Edgar Huidekoper, Meadville, Pa.

First prize bull at Northern Ohio fair, 1879, also first prize at head of herd. First prize at Meadville, 1879. First prize at Conneautville, 1879, also first prize at head of herd.

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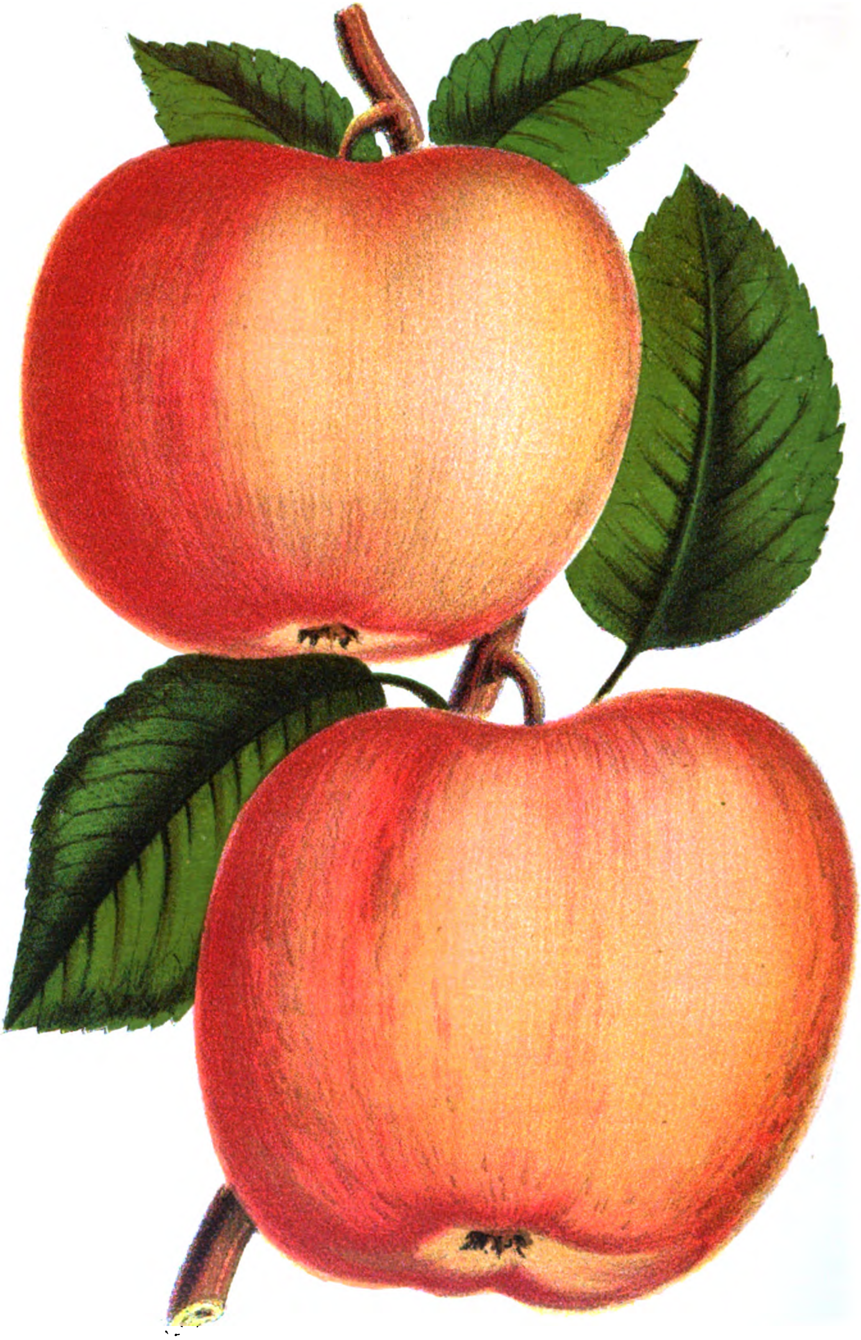


YORK IMPERIAL

KNOWN ALSO AS JOHNSON'S FINE WINTER AND PRINCE.

ORIGIN YORK CO., PA.—Tree moderately vigorous and very productive; young wood rather slender, brown and downy; fruit medium, oblate oblique; skin yellowish white, shaded with crimson in the sun; stalk short, calyx partly closed, basin large, deep; flesh yellowish, firm, juicy, mild sub-acid; core very small; quality good; December to April. One of the most reliable winter Apples in this State.

REPORT

OF THE

PENNSYLVANIA FRUIT GROWERS' SOCIETY.

CONSTITUTION.

[illegible] this association shall be entitled "*The Pennsylvania Fruit Growers'* [illegible] and its objects shall be the advancement of the science of [illegible] generally.

[illegible] person may become a member of this Society by a vote of [illegible] the members present at any meeting, and by paying [illegible] sum of one dollar annually; or the payment of one dollar [illegible] any time shall constitute membership, and entitle [illegible] the proceedings. The payment of ten dollars, [illegible] life membership.

[illegible] shall consist of a President, [illegible] Vice Presidents, a R[illegible] Corresponding Secretary, and a Treasurer, all [illegible] shall [illegible] ballot.

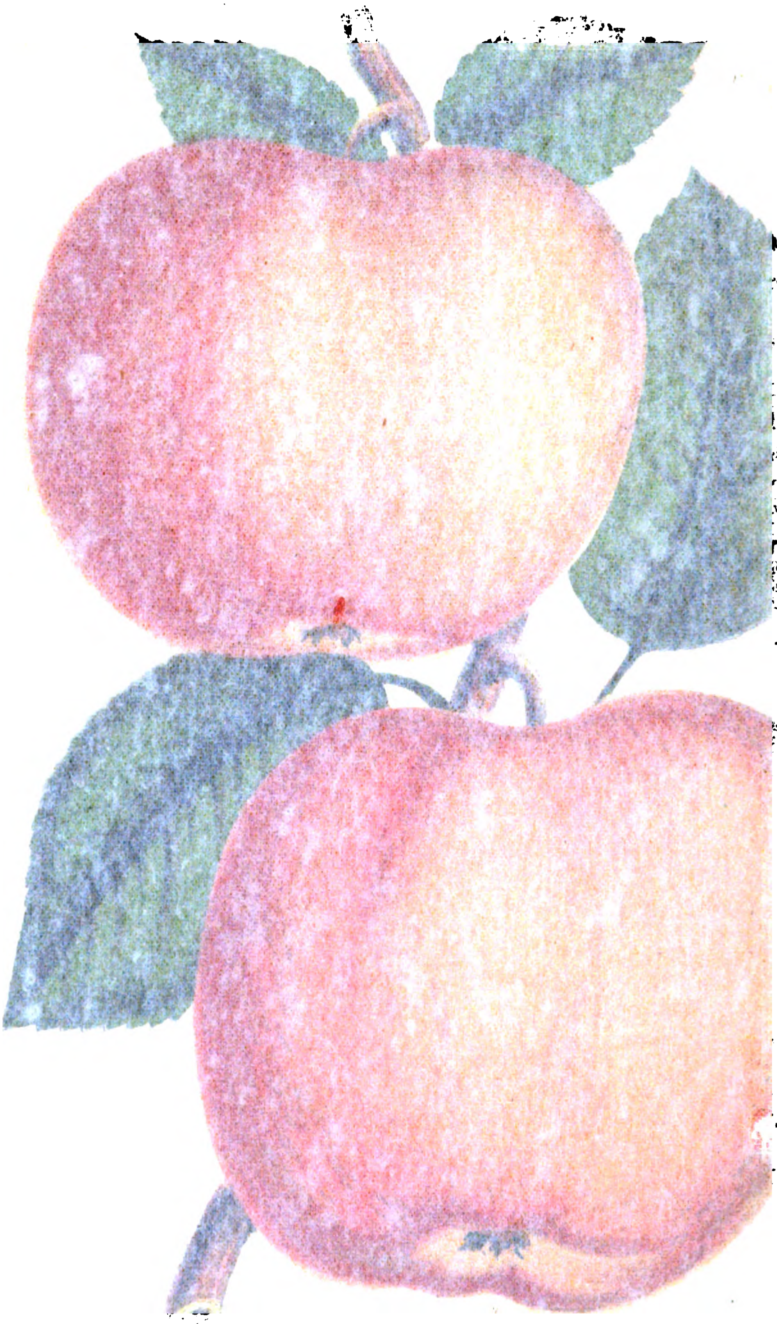
[illegible] 4. [illegible] standing committees shall be [illegible] Com[illegible] nomenclature; a Committee of three [illegible] whom [illegible] entomology shall [illegible] an Executive Committee [illegible] President, [illegible] Secretary, [illegible] and [illegible] Fruit [illegible] one member from each [illegible] represented, with [illegible] chairman [illegible] whole; [illegible] Local Fruit Committees to be [illegible] appointed.

ARTICLE 5. The Society [illegible] meetings,

ARTICLE 6. The Society [illegible] time to time [illegible] entomology, botany, [illegible], and [illegible]

ARTICLE 7. This constitution may be altered or [illegible] two-thirds of the members present, at any [illegible] proposed amendment, in writing, having been pr[illegible]

ARTICLE 8. Seven members shall constitute [illegible] for [illegible] tion of business.



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REPORT

OF THE

PENNSYLVANIA FRUIT GROWERS' SOCIETY.

CONSTITUTION.

Article 1. This association shall be entitled "*The Pennsylvania Fruit Growers' Society*," and its objects shall be the advancement of the science of pomology, and the art of fruit culture generally.

Article 2. Any person may become a member of this Society by a vote of the majority of the members present, at any meeting, and by paying into the treasury the sum of one dollar annually; or the payment of one dollar to the treasurer, at any time, shall constitute membership, and entitle said member to a copy of the proceedings. The payment of ten dollars, at one time, will constitute life membership.

Article 3. Its officers shall consist of a President, three Vice Presidents, a Recording and Corresponding Secretary, and a Treasurer, all of whom shall be elected annually by ballot.

Article 4. The following standing committees shall be appointed: A Committee of five on Nomenclature; a Committee of three on Insects, of whom the professor of entomology shall be chairman; an Executive Committee, consisting of the President, Recording Secretary, and Treasurer; and a General Fruit Committee, consisting of one member from each county represented, with a general chairman of the whole; each member of the Local Fruit Committee to have the privilege of appointing two assistants.

Article 5. The Society may at any time elect honorary members.

Article 6. The Society may from time to time appoint professors on entomology, botany, horticultural chemistry, and geology.

Article 7. This constitution may be altered or amended by a vote of two thirds of the members present, at any regular meeting, notice of the proposed amendment, in writing, having been previously given.

Article 8. Seven members shall constitute a quorum for the transaction of business.

BY-LAWS.

ARTICLE 1. The Committee on Nomenclature shall collate and decide the standard and synonymous names of all fruits known in the Society, with the authorities for each, and report, so far as practicable, at each regular meeting, and record the same in a book kept for that purpose.

ARTICLE 2. The General Fruit Committee shall carefully and thoroughly investigate the subject of fruit culture in general. Each local committee of three shall collect such useful and interesting information in relation to the subject as may be in their power, and embody the same in monthly reports, to be made to the general chairman; such reports to be by him examined and embodied in his annual or semi-annual reports. Also, that the said county committee shall form *ad interim* committees for their respective counties; and further, that said *ad interim* committees are hereby authorized to publish their reports in the "*Gardner's Monthly*," or such other paper as they may select, the same having been first submitted to the chairman of the General Fruit Committee for his approval: *Provided*, That said publication shall be free of expense to the Society.

ARTICLE 3. The annual meeting of the Society shall be held on the third Wednesday of January of each year, at such place as the Executive Committee may appoint, at which time the election for officers shall take place; said officers to serve from the close of the meeting, at which they are elected, to the close of the succeeding annual meeting, at which time an exhibition and discussion of fruits shall take place, and other business transacted in the following order:

1st. Reading of minutes of previous meeting.
2d. Roll called and dues collected.
3d. Election of officers.
4th. Reports of officers.
5th. Reports of standing committees.
6th. Reports of special committees.
7th. Unfinished business of former meeting.
8th. New business.

The nomination and election of new members shall be in order at any time during the session.

ARTICLE 4. Other meetings may be convened by the Executive Committee at such time and place as they may appoint.

ARTICLE 5. No member who is in arrears for dues shall be eligible for any office, or serve on any standing committee; and any member who shall neglect to pay his dues shall cease to enjoy the privileges of membership.

LIST OF OFFICERS FOR 1879.

PRESIDENT.

JOSIAH HOOPES, West Chester, Pa.

VICE PRESIDENTS.

H. M. ENGLE, Marietta.
GEORGE D. STITZEL, Reading.
JOHN I. CARTER, West Grove.

RECORDING SECRETARY.

E. B. ENGLE, Marietta.

CORRESPONDING SECRETARY.

WILLIAM P. BRINTON, Christiana.

TREASURER.

G. B. THOMAS, West Chester.

PROFESSOR OF BOTANY.

THOMAS MEEHAN, Germantown.

PROFESSOR OF ENTOMOLOGY.

S. S. RATHVON, Lancaster.

PROFESSOR OF HORTICULTURAL CHEMISTRY.

S. B. HEIGES, York.

COMMITTEES FOR 1879.

GENERAL FRUIT COMMITTEE.

E. Satterthwait, Montgomery county, *chairman.*
A. R. Sprout, Lycoming county.
Joseph Lewis, junior, Delaware county.
Dr. James Calder, Centre county.
J. O. Martin, Franklin county.
W. M. Pannebaker, Mifflin county.
J. V. Garretson, Adams county.
S. Stevenson, Lackawanna county.
A. S. Shimer, Northampton county.
Casper Hiller, Lancaster county.
E. J. Evans, York county.
A. S. Sheller, Union county.
W. L. Schaeffer, Philadelphia.
J. Murdoch, senior, Allegheny county.
H. S. Rupp, Cumberland county.
Dr. J. Funk, Berks county.
C. H. Nimson, Lehigh county.

COMMITTEE ON NOMENCLATURE.

S. W. Noble, Montgomery county, *chairman.*
Calvin Cooper, Lancaster county.
J. Hibberd Bartram, Chester county.
J. W. Pyle, Chester county.
Ezra High, Berks county.

COMMITTEE ON FLORICULTURE.

Charles H. Miller, Philadelphia, *chairman.*
P. C. Hiller, Lancaster county,
Alexander Burnett, Berks county.
Abner Hoopes, Chester county.
W. P. Brinton, Lancaster county.

COMMITTEE ON ARBORICULTURE.

Howard A. Chase, Philadelphia, *chairman.*
D. G. Engle, Lancaster county.
R. B. Haines, Montgomery county.
George Achelis, Chester county.
William Hacker, Philadelphia.

COMMITTEE ON ORCHARDING.

Thomas M. Harvey, Chester county, *chairman.*
W. S. Bissell, Philadelphia.
J. G. Engle, Lancaster county.
E. H. Cocklin, Cumberland county.
Christopher Shearer, Berks county.

COMMITTEE ON ENTOMOLOGY.

S. S. Rathvon, Lancaster county, *chairman.*
J. S. Stauffer, Lancaster county.
Herman Strecker, Berks county.

COMMITTEE ON ARRANGEMENT AND RECEPTION.

R. H. Grider, Northampton county.
J. L. Stichter, Berks county.
H. Leh, junior, Lehigh county.
E. B. Engle, Lancaster county.

LIFE MEMBERS.

Bartram J. Hibberd, Milltown, Chester county.
Brinton, W. P., Christiana, Lancaster county.
Bissel, W. S., Pittsburgh.
Calder, Rev. James, State College, Centre county.
Cornelius, Robert, Philadelphia.
Ellis, B. Morris, Hughesville, Lycoming county.
Engle, J. G., Marietta, Lancaster county.
Engle, H. M., Marietta, Lancaster county.
Engle, E. B., Marietta, Lancaster county.
Garretson, Joel V., Flora Dale, Adams county.
Hayes, Charles P., Germantown.
Heyser, Jacob, Chambersburg, Franklin county.
Hildrup, W. T., Harrisburg, Dauphin county.
Hoopes, Josiah, West Chester, Chester county.
Hiller, Casper, Conestoga, Lancaster county.
Hiller, Peter C., Conestoga, Lancaster county.
Hacker, William, Philadelphia.
Landis, Israel, Lancaster, Lancaster county.
Martin, J. O., Mercersburg, Franklin county.
Pannebaker, William M., Lewistown, Mifflin county.
Reist, Peter S., Oregon, Lancaster county.
Shaffner, Jacob, Wheatland, Dauphin county.

HONORARY MEMBERS.

Barry, P., Rochester, N. Y.
Downing, Charles, Newburg, N. Y.
Elwanger, George, Rochester, N. Y.
Meehan, Thomas, Germantown, Pa.
Michener, Dr. E., Tough Kenamon, Chester county, Pa.
Parsons, S. B., Flushing, N. Y.
Parry, William, Cinnaminson, N. J.
Rathvon, Prof. S. S., Lancaster.
Rowe, Hon. D. Watson, Chambersburg.
Saunders, William, Washington, D. C.
Stauffer, Jacob S., Lancaster, Lancaster county, Pa.
Thomas, John J., Union Springs, N. Y.
Warder, Dr. John A., North Bend, Ohio.
Willets, Rev. Dr., Philadelphia.
Wilder, Hon. M. P., Boston, Mass.

ANNUAL MEMBERS.

Achelis, George, West Chester.
Biddle, F. C., Chadd's Ford, Delaware county.
Blessing, Paul, junior, Coatesville.
Boyer, Bassler, Lebanon.
Brandt, R. E. B., Mechanicsburg.
Breniser, Charles, Reading.
Brindle, A. C., Mechanicsburg.
Brinton, S. L., West Chester.
Brinton, Moses, Octoraro.
Burnett, Alex. D., Reading.
Burnett, Alex., Reading.
Carter, John I., West Grove.
Chaapel, Harry, Williamsport, Lycoming county.
Chase, Howard A., 10 N. Merrick street, Philadelphia.
Chase, R. G., Geneva, N. Y.
Christmas, Isaac F., Stonersville, Berks county.
Cocklin, E. H., Shepherdstown, Cumberland county.
Cocklin, Jacob, Shepherdstown, Cumberland county.
Cooper, Calvin, Bird-in-Hand.
Darlington, R. S., West Chester.
Davis, E. M., 205 Walnut Place, Phila.
Dykeman, G. R., Shippensburg.
Eby, J. R., Harrisburg.
Eby, Simon P., Lancaster.
Edge, Thomas J., London Grove, Chester county.
Engle, Daniel G., Marietta, Lancaster county.
Eppehimer, Henry, Reading.
Erb, John B., Lampeter, Lancaster county.
Evans, E. J., York.
Fisler, I. E., box 214, Harrisburg.
Foresman, D. H., Williamsport, Lycoming county.
Frantz, M. A,, Harrisburg.
Funk, J. H., Boyertown.
Garber, J. B., Columbia.
Geiger, M. Z., Geiger's Mills.
Gerhart, Dr. T. S., Beckersville.
Greenleaf, R. P., M. D., Henry Clay, Del.
Greth, A. C., Reading.
Gross, D. M., Harrisburg.
Grover, Leverett, Windsor, Ohio.
Guthrie, W. D., Chambersburg.
Haines, Henry C., Germantown.
Haines, John S., Germantown.
Haines, R. B., Cheltenham, Montgomery county.
Hamilton, A. Boyd, Harrisburg.
Harrison, A. W., Queen st., Germantown.
Harvey, Thos. M., West Grove, Chester county.
Heiges, J. M., York.
Heiges, S. B., York.
Herbein, Dr. J. S., Sinking Spring.
Hiester, Charles E., Harrisburg.
High, Ezra, Reading.
Hoopes, Abner, West Chester.
Hostetter, H. F., Oregon, Lancaster county.
Huber, John, Litiz, Lancaster county.
Jameson, James, Reading.
Kauffman, Levi, 400 Walnut street, Phila.
Kendig, M. D., Creswell, Lancaster county.
Kiner, A. N., Shippensburg.
Knabb, Jacob, Reading.
Krick, Henry B., Sinking Spring.
Landis, B. L., Landis Valley, Lancaster county.
Lauer, H. Fred'k, Reading.
Leh, J. H., Allentown.
Lewis, Joseph, junior, Newtown Square, Delaware county.
Lingle, John L., Harrisburg.
Linn, John, Chambersburg.
Lint, Peter, York.
Longsdorf, H. A., Mechanicsburg, Cumberland county.
Manbuh, E. K., Sinking Spring.
Martin, Tobias, Mercersburg, Franklin county.
McCoy, C. C., Chester, S. Carolina.
McMillan, C. C., Gettysburg.
Merceron, F. F. Catawissa.
Miller, D. N., Harrisburg.

Miller, Charles H., Mt. Airy, Philadelphia.
Mishler, E., Reading.
Mitchell, J. E., 310 York avenue, Phila.
Mumma, Hon. D., Harrisburg.
Neff, J., Dallastown, York county.
Nimson, C. H., Allentown.
Nissley, C. B., Mechanicsburg.
Noble, S. W., Jenkintown, Montgomery county.
O'Neill, Michael, Scarlet's Mills.
Parker, J. T., Mercersburg, Franklin county.
Potts, W. C., Lewisberry, York county.
Purple, S. H., Columbia.
Pyle, J. W., Willow Dale, Chester county.
Ralston, John, Reading.
Reed, William G., Chambersburg.
Reist, Levi S., Oregon, Lancaster county.
Reynolds, S. H., Lancaster.
Rhoads, Dr. R. B., Douglassville, Berks county.
Ritter, W. S., Reading.
Roberts, Rowland, Horsham.
Rufe, Morgan, Doylestown.
Rupp, H. S., Shiremanstown, Cumberland county.
Rush, John A., McVeytown.
Satterthwaite, E., Jenkintown, Montgomery county.
Saxton, J. O., Mechanicsburg.
Scarlet, Levi, Christiana.
Schæffer, W. L., Girard National Bank, Philadelphia.
Shalter, Edwin, Reading.
Sheetz, J. A., Womelsdorf, Berks county.
Sheller, Alf. S., Lewisburg, Union county.
Shelly, Daniel, Shiremanstown, Cumberland county.
Shenk, Major R. W., Lancaster.
Shimer, A. S., Redington, Northampton county.
Shoch, Samuel, Columbia.
Shoemaker, R. C., Jarrettstown, Montgomery county.
Small, Samuel, York.
Small, Samuel, junior, York.
Smith, Dr. A., Wernersville.
Smith, F. L., Reading.
Snively, John K., Jackson Hall, Franklin county.
Sprout, A. R., Picture Rocks, Lycoming county.
Steck, Dr., Picture Rocks, Lycoming county.
Stevenson, S., Clark's Green.
Stichter, J. L., Reading.
Stitzel, George D., Reading.
Strode, A. Darlingion, West Chester.
Suesserott, Dr. J. L., Chambersburg.
Thomas, G. B., West Chester.
Underwood, Alex., Mechanicsburg.
Wagner, Henry, Reading.
Wanner, Peter D., Reading.
Weaver, Reuben, Mastersonville, Lancaster county.
Weiser, B. H., York.
Williams, J. S., New Hope, Pa.
Woods, T. A., Harrisburg.
Young, John G. B., Reading.
Young, William M., Reading.
Zerr, Jacob G., Geiger's Mills.

PENNSYLVANIA FRUIT GROWERS' SOCIETY.

The twentieth annual meeting of the Pennsylvania Fruit Growers' Society will ever be kindly remembered by all who had the pleasure of attending its sessions.

Quite a number of interesting and practical papers were read, several fine *ex tempore* addresses were made, and many brief and pointed discussions were thus brought out. President Hoopes was missed from his accustomed place, having been detained at home by sickness. A very pleasant incident of the meeting was a banquet to the Society, after the first evening session, at the residence of Col. J. L. Stichter, which was generally attended and much enjoyed by all.

The arrangements for the meetings of the Society, and the comforts of its members were admirable, and many thanks are due the local committee, Messrs. J. L. Stichter and Judge Stitzel, for their untiring labors in making the meeting a success.

THE MEETING.

The Society convened at Reading, Pennsylvania, January 15, 1879. Vice President H. M. Engle, in the chair. In assuming the duties of president, he deplored the absence of Mr. Hoopes, who, he stated, has been the life and controling spirit of the Society since its organization. Being the only Vice President who was present, he would not shrink from the duties imposed upon him, but hoped any mistakes or errors would be corrected by his fellow members.

The minutes of previous meeting were then read, after which the Society was welcomed by Col. Stichter, as follows:

MR. PRESIDENT AND GENTLEMEN OF THE PENNSYLVANIA FRUIT GROWERS' SOCIETY: In behalf of the Berks County Agricultural and Horticultural Society, I have the pleasure to welcome you to the city of Reading, and to assure you that this county has not been unmindful of the importance of fruit culture. In the eighteenth century the "Seckel" pear was planted on her soil; one of these veteran trees stands on my grounds, and bids fair to fruit for many days. The parent tree of this world-renowned fruit stands on what was once the farm of Lawrence Seckel, below Philadelphia, and is still in a healthy condition. The "Reading" pear, of such wide reputation, is a "seedling." The following twenty-seven are acknowledged native varieties of apples, of approved excellence, of which we may well be proud: Hiester, Keim, Boas, Hain, Housum's Red, Phillippi, Miller, Stehle, Krauser, Hepler, Baer, Marks, Yost, Hughes, Kelsey, Gewiss Goot, Neversink, Orange, Meister, Champagne, Ritter's Sweet, Evening Party, Lesher, Ohlinger, Red Apple, Staudt, Zieber. Under the fostering care of the Berks County Agricultural and Horticultural Society, over fifty thousand fruit trees—the majority peach—have been planted during the last two years. How gratifying a reflection that soon our fruit productions in Pennsylvania will, in a measure, make up the loss occasioned by the depression in mineral and other interests. Anticipating much pleasure and profit in attending this convention, I again bid you a cordial welcome to this city and county.

Vice President responded briefly:

This hearty welcome calls for an equally hearty response, for which he did not have words to reply. He fully appreciated the kindness that prompted this speech of welcome, and tendered thanks in behalf of the society. This body has been rather an itinerant one since its organization, and has held its meetings in different parts of the State, not so much to impart as to receive instruction, and to enlarge its field of usefulness by receiving new members. He hoped our list of members would be largely increased here, and that harmony and good feeling characterize all our deliberations.

The Treasurer, Mr. GEORGE B. THOMAS, announced that persons could join the Society at any time, by having their names entered upon the roll, and paying the annual fee of one dollar.

The Treasurer's annual report was read and referred to the following committee of audit: Messrs. Thomas Meehan, Judge Stitzel, and L. S. Reist.

GEORGE B. THOMAS, *Treasurer, in account with Pennsylvania Fruit Growers' Society.*

1878.		*Dr.*
January 15, to cash on hand,	$237 93	
April 29, to cash from annual dues,	46 00	
November 4, to cash from E. B. Engle, per J. Hoopes, being balance of appropriation from the State—salary of Secretary,	30 00	
		$313 93

1878.		*Cr.*
January 17, by cash paid E. B. Engle, salary and expenses, as per bill,	$32 83	
January 17, by cash paid E. B. Engle, printing, as per bill,	3 60	
January 17, by cash paid John I. Carter, printing, as per bill,	2 00	
January 17, by cash paid A. R. Sprout, printing, as per bill,	1 25	
January 17, by cash paid City Hotel, as per bill,	1 50	
January 22, by cash paid Josiah Hoopes, as per bill,	18 65	
March 7, cash paid F. S. Hickman, printing, as per bill,	13 00	
April 12, by cash paid Adams Express Company, freight, as per bill,	1 75	
October 19, by cash paid Josiah Hoopes, express charges, as per bill,	25	
November 4, by cash paid Ed. J. Nolan, drawing, as per bill,	25 00	
1879, by cash paid stamps and stationery, as per bill,	1 25	
By cash balance,	212 85	
		$313 93

1879.	*Dr.*
January, to cash on hand, ...	$212 85

Audited and found correct.

THOMAS MEEHAN,
GEORGE D. STITZEL,
LEVI S. REIST,
Committee.

READING, *January 15, 1879.*

Reports of standing committees being next in order, the report of Mr. Carter, chairman, General Fruit Committee, was read by Mr. Thomas.

REPORT OF THE GENERAL FRUIT COMMITTEE.

To the Pennsylvania Fruit Growers' Society:

The chairman of the General Fruit Committee respectfully submits the following report, and therewith the accompanying correspondence. As these letters are well worthy of your attention, I cannot do better than offer them to you unabridged. We regret the necessity of having to report a season of very unfavorable results to orchardists and fruit growers throughout the State; and, as confirmatory of this view of your committee, we give a synopsis of fruit products, taken from the late quarterly report of the Secretary of the State Board of Agriculture. We have divided the State into four sections, and give the average per cent. of this year's fruit crop, as compared with former years, as follows:

	Apples.	Peaches.	Pears.	Cherries.	Grapes.
North-western part of the State, .	57	50	55	46	69
North-eastern part of the State, .	63	56	63	57	71
South-western part of the State, .	55	57	56	65	71
South-eastern part of the State, .	57	58	69	49	81

Showing an average for the State of only five to ten per cent. more than half a crop of above fruits, except cherries and grapes, which did better. When we add to this showing, the extremely low price of fruits, and the unprecedented rotting of late apples, we have a resulting whole anything but pleasant to look back upon, or encouraging to future efforts. But perhaps we should not be too much discouraged. We hear of cases where good yields have been secured, and the crops remunerative.

Several of our sub-reports speak of such cases. They are cases where special attention has been given to the case of the crop; and all point to the growing necessity of giving to fruit raising—if we follow it at all—a more intelligent and liberal support. Weeds and bushes will grow without care or attention; not so with good fruit. We can only hope for profitable success when we learn to give to the fruit crop the same anxious thought, labor, and manure that we give to our premium corn crop. An apple tree, bearing from forty to sixty bushels, would be worth a great deal more than the same area in corn, yet it never receives half the care or manure the corn does. If we neglect to manure or work our corn-field, we could expect no crop! Why should it be otherwise with our orchards?

There is one thing farmers must learn sooner or later, and that is, if they expect to raise and sell fruit at a profit, they must not undertake to run a dairy, raise grain, and grow truck at the same time, with only capital and ability enough to do one of these things well!

It is no doubt proper enough for every landowner, who has a family, to raise fruit for his own wants, but this mixed, or more properly, this diffused husbandry of our country, is the ruin of its success in any one thing. We must employ more intelligence and means on our work, or take a narrower swarth! The old idea of the advantages of a mixed husbandry, or mixed business of any kind, is becoming obsolete. To do anything with a profit now-a-days, we must do it well; and this we cannot do if we have too many irons in the fire, or our energies or means diffused over too much space.

The great business enterprises of our country are gradually running into this channel of concentration and simplification; and farmers must adopt it, as far as they can, for it is based on correct business principles. It may be objected, that if we depend too much upon one source of profit—our failures, when they come, will be ruinous, because we have no other resource. But the true business man calculates to overcome common failures by skill and watchfulness, and avoids those enterprises where failures crush to death. Surely fruit raising is not one of that kind.

The fruits of our good old Commonwealth are not surpassed, indeed, are hardly equaled by those of any State on the Atlantic slope. Our varied soils and situations, exactly suit the wants of some one or more kinds—and our nearness to market, our plethory of capital, our sources of education, and the accessibility of manures and fertilizers, give us advantages not easily outweighed. Prudence, skill, faith, and zeal, will yet make fruit growing in our State a success.

We must not despond from this year's failures! Mr. Pennebaker saved his peach buds from frost by strengthening them with appropriate fertilizers; while Mr. Balderson saved his apples from untimely ripening, by protecting his ground and trees from heat and drouth by thorough soil pulverization and mulch—and so might most of the enemies to success be met. The business troubles of our country have now reached "hard pan." We are ready to take a fresh start, and with each of our products, compete in all the markets of the world. The people of the eastern world are only in the midst of their crushing troubles, while we are ready to pitch in and win, and carry our products to their very doors, and defy them to undersell us. With reviving business, people will eat—they will eat more and better fruit—and the fruit growers of Pennsylvania will furnish a generous share.

John I. Carter,
Chairman.

Of the sub-reports accompanying the foregoing report, all are valuable and interesting, and deserving of publication. Owing to want of room, however, all could not be published at this time. The following are preferred on account of brevity:

THE FRUIT CROP IN LANCASTER COUNTY.

The fruit crop in Lancaster county has been so poor last season that we have little to report. Cherries were almost a total failure. The weather was unfavorable at blossoming time—the bloom was splendid, but kept in perfection over two weeks, thereby showing that the pollen did not properly ripen. The fruit that did set, rotted before fully ripe. Amongst some thirty varieties growing on my place we did not get fruit enough for a pie, except a few early Richmonds.

Strawberries were a medium crop. Five or six successive dry seasons have discouraged many growers of this fruit, and less are planted than some years ago. The sorts of most value are Wilson, Charles Downing, Monarch of the West, and Triumph of Cumberland. The last two are very fine, quite hardy, and moderately productive. These, and glowing accounts of the beauty, size, &c., of Sharpless, Miner's Great Prolific, Forest Rose, Great American, &c., have created some enthusiasm, and the prospect is, more will be planted in the spring than for some years past.

Raspberries and blackberries receive less attention than ten years ago. The frequent injury the canes receive from cold changeable winters, and the low prices and small demand for the fruit make no special inducement to cultivate them. The wild fruit is often sold in our market as low as three cents a quart.

Peaches were not plenty. In some few places, where trees were specially thirfty, the crop was fine. Many trees through our county annually perish by yellows, in spite of the assertion of some eminent pomologists, that "well authenticated cases of yellows are rare." There is no doubt, that we could prevent the yellows, by special care; say by selection of healthy stock, by proper and sufficient fertilizers, by pruning and cultivation, and by thinning the fruit. But all this does either not pay, or is too much trouble to carry out.

Pears have not been so poor for many years, both in quantity and quality. The only first-class pears that I saw this year were grown by some amateur fruit growers in Lancaster city. Indeed, Lancaster city is becoming noted for fine pears and grapes. Blight was very destructive last season. If no remedy is found, the profits and pleasures of pear growing will be much impaired.

Grapes that escaped the heavy spring frost were pretty good. Concord, Hartford Prolific, Telegraph, Clinton, and Ives are the "stand-bys." Rogers' Hybrids are fine, but not always reliable. No. 3, No. 4, No. 9, and No. 19 are of better quality than the above, and succeed reasonably well. The number of new grapes that have been brought out during the last twenty years is legion. They were all to be better than Concord, but three or four years' experience with them generally give one enough of them, and they are heard of no more.

Apples also were a poor crop, not so much in quantity as in quality. Many orchards had quite enough of fruit, but it was knotty and imperfect. This imperfection I attribute to unfavorable weather and imperfect fertilizers, more than to insect depredations. Then, too, we had an extremely dry and hot summer, which caused the fruit to ripen prematurely, and, consequently, had no keeping quality. At our Lancaster market you might probably find one hundred bushels of New York State apples where you would find one bushel of home grown. Prime York State apples can be bought for two dollars, and even less, per barrel.

This state of the apple crop is a frequent case with us—we fail in winter apples. Those who can remember back from thirty to fifty years, know that this was not always the case. For instance, the Rambo and Smokehouse could then be kept, with ordinary care, until February. Now these varieties generally fall off the trees before the "dark of the moon, in October," the time when we used to pick our winter fruit. We have made but little progress in introducing winter apples—varieties that will hang on the trees till November, if you desire to leave them hang that long. The Lady Apple is the type. I picked some sound ones this year as late as the middle of December. York Imperial, Tewksbury Blush, and Lancaster Greening are good hangers, and, as long as we can have nothing better, are well worth growing; but in quality they are nowhere alongside of Baldwin, Belmont, King of Tompkins County, Hubbardson, Nonsuch, &c.

CASPER HILLER.

GIRARD NATIONAL BANK,
PHILADELPHIA, *January 8, 1879.*

JOHN I. CARTER, Esq., *Chairman, &c.:*

DEAR SIR: I have your favor of the 29th ultimo, and now proceed to give you what little information I can on the subject desired.

The apple crop in this section was large, but the winter and late fall apples did not keep. Baldwin trees were full, but rotted by November. Tallman's Sweet never has kept over October with me, and this year was no exception. The only apples I now have out of a number of varieties are the Carthouse, Sweet Can, and Rigley. This last is the most valuable I have; first class for cooking, good for eating in the winter, and a great keeper. It will hang on the long flexible branches till November, and withstand all the violent wind-storms of the autumn. The Ridge Pippin is also valuable for its keeping qualities, fair quality, and sightly.

The peach is now attracting great attention in this section. For many years we could raise no peaches, but now the trouble, whatever it was, has mysteriously passed away, and we think we can raise as fine fruit as ever. I subjoin a list of those that do well here, with about the time they ripen:

		Flesh.
Hale's Early,	July 20.	Red and white.
Troth's Early,	Aug. 1.	Red and white.
Mountain Rose,	Aug. 10.	Red and white.
Mary's Choice,	Aug. 15.	Red and white.
Early York,	Aug. 20.	Red and white.
Oldmixon,	Aug. 25.	Red and white.
Yellow Rareripe,	Sept. 1.	Yellow.
Harker's Seedling,	Sept. 10.	Red and white.
Stump the World,	Sept. 15.	Red and white.
Crawford's Early,	Sept. 15.	Yellow.
Crawford's Late,	Sept. 20.	Yellow.
Ward's Late,	Sept. 20.	Red and white.
Smock,	Sept. 25.	Yellow.
Reeves' Favorite,	Oct. 1.	Yellow.
Salway,	Oct. 15.	Yellow.

I have no doubt this list could be extended, but these are some of the best and most reliable kinds.

Small fruits.—The strawberry was rather a failure, while blackberries and raspberries were quite abundant. The Saunders and Herstine raspberries are good and productive.

Very truly yours,
W. L. SCHAFFER.

READING, PA., *December 31, 1878.*

JOHN I. CARTER, Esqr., *Chairman:*

DEAR SIR: Notwithstanding this was the "apple year" in this part of the country, there were, however, few apples in this county, owing, principally, to the ravages of the tent caterpillar, which made its appearance unusually early last spring, and, where they were not destroyed, they stripped the trees of their foliage, and nearly ruined young orchards. My way of dealing with them is to use coal oil, freely applied with a swab. In this way, I raised a large crop of apples, and kept the trees in a much healthier condition than those who neglected to remove the caterpillars.

The pear crop was rather good, the pear tree not being so liable to be attacked by said insect. A frost, on May 13, injured the peach and grape crop to a considerable extent. Peach cultnre has been receiving considerable attention in this county in late years, and has proved quite a success, especially on thin or sandy soil, which is worth little for agricultural purposes.

On my annual return trip from the west last spring, I had the pleasure of visiting the fruit farm of George W. Lee, at Homeworth, Ohio, who makes small fruit growing a specialty. He had the finest strawberries I ever saw grown anywhere, California not excepted. He marketed, from three and one fourth acres, three hundred and twenty-five bushels. Mr. Lee rates the Green prolific and Ohio mammoth as the most profitable. He has, also, discovered a remedy to keep the curculio off of the plum, by merely throwing soft or bituminous coal ashes over the trees several times a week during fruiting time; this should be done in the morning, while the trees are wet with dew. In our section, the small fruit crop was fair; would have been better but for the drouth which set in rather early in the season. This class of fruit is becoming much more extensively cultivated than heretofore, especially the strawberry, on account of its ready sale, and the renumerative price it commands in the market.

The committee appointed by the agricultural society in January, 1876, (of which I am a member,) have visited a number of fruit farms in this county, and estimate that at least fifty thousand trees have been planted, largely stimulated by the offer of $400 premiums by the society.

Yours, &c.,

GEORGE D. STITZEL.

Messrs. GEORGE B. THOMAS and CHARLES H. MILLER, who were appointed a special committee to investigate a claim against the society, by Mr. Marot, of Philadelphia, made a verbal report. They stated that Mr. Marot had promised to furnish a statement of the account, but had failed to do so. On motion, the committee was continued, and authorized to effect a settlement, and pay a portion of the claim on account.

New business being called, the chairman stated that a resolution was offered at last annual meeting, to change the constitution so as to allow the appointment of one vice president for each county in the State. This question was in order now, and should be disposed of.

Mr. MEEHAN thought it unnecessary to make any change in the constitution, as there is already authority for the appointment of sub-chairmen for General Fruit Committee, and this would doubtless cover the whole ground. The subject was indefinitely postponed.

The Chair read the programme of essays and addresses as announced for the meeting, and asked the pleasure of the Society as to what be taken up.

Judge STITZEL suggested that, as some of the members expected are not yet present, it would be premature to proceed with the regular programme. He called attention to the fact that Chairman Carter, of the General Fruit Committee, had spoken very highly of the sub-reports sent to him, and thought they might be read with profit.

On motion of Mr. BRINTON, they were read by the Treasurer.

The report of Mr. Hiller, of Lancaster county, was read and discussed.

Mr. REIST considered quality a matter of individual taste. While Mr. Hiller does not like the quality of York Imperial, Charles Downing and many others call it good. It certainly is one of the most valuable of our winter apples, as it can be kept until spring, while Baldwin and Hubbardston are but fall apples in this latitude.

Mr. **THOMAS** considered York Imperial one of the most valuable apples in the State, both for quality and productiveness.

Mr. **GARRETTSON** finds it a very valuable apple with him. Thinks it somewhat subject to borers, on account of its tender bark. Rhode Island Greening and Baldwin also do well with him.

Mr. **MEEHAN** didn't agree in the statement that strawberries were generally a failure, and stated that in some portions of the West the finest crops were raised by irrigation. Thought this a profitable subject for discussion here in the east, and that it might be profitably employed in fruit culture here.

Judge **STITZEL** has learned that soil has much to do with strawberry culture. In California they do not attempt their culture without irrigation. Saw in Homeworth, Ohio, last summer, the finest strawberries he ever saw anywhere, California not accepted. Three hundred and twenty-five bushels were picked from three and a quarter acres, and sold at an average of twelve cents per quart.

Mr. **THOMAS**, referring to Judge Stitzel's letter, inquired whether dust would not answer as well as coal ashes for the destruction of curculio on the plum.

Judge **STITZEL.** Nothing has proven so satisfactory as coal ashes.

Mr. **MEEHAN.** This is a very interesting subject, and well worth all the time we can devote to its discussion. Has heard of saving crops of plums with lime, coal dust, &c., but they have generally been abandoned in a year or two. Success has been the result of accident rather than any merit in these remedies. Had heard that to plant plums in a chicken-yard, would secure regular crops of fruit. Tried the experiment, at a considerable expense, only to be disappointed in the end. Tried, also, to secure crop by covering with mosquito net, but without success. Thought, however, there might be some virtue in dust, and noted the fact, that along the Ridge Avenue road, in Philadelphia, before it was paved, plums and cherries were a certain crop.

Mr. **HILLER.** Have no doubt of the efficacy of dust for curculio. Frequently see plum trees, along dusty roads, bear fruit when they fail elsewhere. The dust must, however, be applied daily, as this insect is an inveterate worker. Jarring is, also, a good plan, but rather much trouble.

Mr. **THOMAS** thought it was the concussion, and not the dust, that prevented the curculio from doing its work. Trees along road-sides are kept more or less in motion by passing vehicles, while it prefers quiet when depositing its eggs. Mr. J. J. Thomas, a very successful plum grower, in New York, has a man to jar his trees daily with a mallet.

Mr. **STEVENSON**, also, favored the jarring process. The Messrs. Smith, of Geneva, New York, adopt this plan, and find it successful.

Mr. **THOMAS** thought it was the concussion, more than the dust and coal ashes, that accounted for the success of Judge Stitzel's friend. Coal ashes would cause more concussion than dust, hence a better remedy.

Mr. **MILLER** suggested that if concussion only were necessary, it would be a good plan to plant plum trees along railroads.

Mr. **ZERR**, in referring to the statement of Mr. Sprout, of Lycoming county—that the fruit crop, in that and adjoining counties, was about half a crop—thought that farmers and fruit growers, generally, were at fault themselves. They neglect to fertilize their trees after a crop of fruit. Has found nothing better than wood ashes.

Mr. **GARRETSON** thought we sometimes fertilize too well, and make too much wood growth. Has raised some of his best crops of fruit on poor soil.

Mr. **THOMAS.** The difficulty is that farmers are disposed to pay more attention to their cattle than anything else. We cannot expect something from nothing. The whole thing, in a nut shell, is to pay proper attention to whatever we undertake.

JUDGE STITZEL. Fertilizers are very essential, but they, alone, will not answer. Cultivation is also necessary.

Dr. J. H. **FUNK** stated his experience in orchard culture. Found grain and grass injurious to young trees, while hoed crops seemed beneficial.

Mr. J. G. **ZERR** inquired whether apple pomace would be beneficial to trees.

Mr. **MILLER** thought it would. Is, however, not an orchardist, and does not grow fruit. Thinks young orchards should be cultivated, but not necessary when trees are old enough to shade the ground.

Dr. **FUNK** considers pomace injurious, owing to the acetic acid they contain. Would cultivate orchards until ten or twelve years old.

Mr. **LEWIS'** letter was read, and opened the subject of "Pear Culture and Blight."

Mr. **MERCERON** could not recommend Kingsessing. With him, it was first to be killed by blight. Lawrence blight but little, and are the finest trees on his grounds. Seckel blight some.

The following essay was next read by the Secretary:

PICTURE ROCKS, *January 8, 1879.*

To the Pennsylvania State Fruit Growers' Society, assembled at Reading, Pennsylvania:

GENTLEMEN: Your circular calling my attention to our present annual session, and also requesting that I should favor the Society with a paper, choosing my own subject, was duly received.

The subject of my choice, on which I venture these remarks, will be found neigher fraught with flowers or fancies, and as we lay hold of it, we prefer to get at the root of the matter. Our subject being "Virulent Matter, commonly called Sewage—How to Utilize the Same by its Application to Fruit Growing, and how to Obtain the Best Results." In the first place, it is well known than an error exists with us as a people, in the neglect of caring for the sanitary condition of our domestic premises. The pernicious and slip-shod habits, that many have drifted into, of allowing all manner of human and animal filth to accumulate in immediate nearness to their dwellings, namely, the contents of barn-yard, pig-sty, fowl roosts, privy vaults, kitchen—sink drains, and things in general, seriously need correction. Who does not know that the combined influence of these off-scourings, is enough to contract contagious pestilence. Agues, chills, typhoid, and malignant fevers, are frequent results from these deleterious conditions. We have known of cases where the situation was supposed to be out of reach of such influences; but when the dwellers there were overtaken by the destroyer, and the situation taken in, the house well was found to be a natural cess-pool into which the drainage fell, having percolated through the thin surface soil that rested on an impervious, argilaceous bed. From this the family supply of water had been drawn, which accounted for the mischief.

The situation is none the less dangerous where the soil is deeper and the underlay more porous, provided the surroundings are at fault the same. Another fault is the wanton waste by which means fruit trees are often surfeited and others poisoned or burned, the result being often disastrous. The opposite extremes may be the need of the same thing properly applied, while per chance a few may escape between, receiving a slight benefit. A case in point was a newly improved place, where each side, and near to a newly made privy vault, were planted fruit trees, (apple and pear.) Twenty years later the trees were entirely dead, both root and branch on the sides thereto as though scorched by fire. Though we have digressed, yet we have desired to lay open the subject to its foundation, showing that not only is reform needed, but if the same is carried out it will improve our sanitary condition and give us a start on the road to wealth.

We shall now endeavor to give some idea of the results, which an experience of over forty years has taught us. The organic structure of plants should be first considered. Reliable authorities tell us that they are composed specifically of carbon, hydrogen, and oxygen, these being the organic constituents, and the same in all. The inorganic constituents being found in indefinite quantities, namely, potash and other salts, leaves us naturally to infer that they appear in the plant accidentally, and that the same are non-essential, the parts being found to vary in proportion to quantity in the soil where the plants are grown. Another constituent is silex, which being insoluble in water, and found to exist as an exterior coating, we may safely infer that the same is added by a different process, namely, uniting with the body of the plant by adhesive action.

We have now reached a point where we have to grapple with the great natural enemy, that of excrementitious and other contaminating matter, and if we are able to turn its guns, our hopes will be improved.

Admitting that the flesh of the ox, the most tender plants, and the solid wood, each are composed of the same organic constituents, differing only in proportions, we can safely adopt any and all available matter that can be decomposed and converted into liquid form, so as to produce carbonic acid gas, the food of all plants. To effect this, we must decompose, dissolve, and dilute, then apply to the earth's surface, which is the great laboratory of nature, where the gases are being formed and are being taken up by the countless millions of feeders of the growing plants. In planning for farm and home, second to none should be the situation of the compost hearth. The same should be located with ways to and from every point where contaminating matter would collect, which with care can also be so planned to be out of sight from the more desirable points. This, if properly chosen, and the system carried into effect, is the farmer's own deposit, paramount to all others, for in it is the basis of wealth and a good living.

The arrangement of a compost hearth may be in width from six to twelve feet, and in length as need requires. The floor should be made of cement or clay, which should be well packed, having posts set along the sides one or two feet high, to support side boards for walls. The end of the hearth nearest to the house, should be provided with posts high enough to receive a barrack roof, and a loose plank floor about seven feet from the ground, on which to keep for drying absorbent matter, earth, and the like. To operate the concern, the principle part, which is without cover, can be occupied for decomposing stable and other coarse manures, which should be milled or hand-worked until made fine and well mixed, before being applied to the soil.

We now come to the test, which is that of handling the house slops and night soil. We admit of its being a difficult task, but it is one of nature's necessities, and must be met. Here we may as well bear in mind, that nature's laws cannot with impunity be violated, for if we allow fever dispensaries, in the form of cesspools and foul sink drains about our premises, we shall be taxed for it, and death and doctors will do the collecting. With a liberal supply of dry earth, (the better if composed of decayed vegetable matter like swamp muck,) the work can be easily accomplished, for the same is a rapid absorbent, and when mixed with foreign matter, is a powerful deoderizer. First fill the roof covered part of the hearth to the depth of two or more feet, then as the slops are daily added, bring down from the floor above the dry earth, as required to keep the mass in proper condition for mixing and carting away. It is not to be supposed that the sewage of a house, occupied by a large family, can all be used in this way to practical advantage. In such case, the liquid must be partly disposed of in other ways; that is, the more cleanly waters be distributed on the grass grounds and about fruit trees, while only the first seeds from washing, and the like, with night soiling, may go to the compost.

The third space occupied on the hearth should be mentioned—that for privy contents—not supposing, however, that such a thing as privy vault exists, for they are an abomination in the sight of God or man; for did not the Prophet Moses, in his commands, as recorded in Deuteronomy xxiii, 12, 13 and 14, so signify? But still, if a vault one has, let him first clean it out and fill to the level, and, instead thereof, leave the back underpining open; besides, have provided within a liberal quantity of dry road dust, and a small tin scoop. This should be used at every call, the contents to be removed often to the compost hearth. In place, or in addition to this, the dry earth closet system is recommended. Let there not be a depression on the premises, where filth can find a lodgement for a day. To every part of privy contents that is placed on the hearth, add at least ten of earth, or weak stable manure. This excrementitious matter, so powerfully charged with nitrogen, should have at least a twelve month to become decomposed and neutralized, after which great caution should be used in applying to or near the roots of growing plants.

We now have a word to say on the application of these preparations to fruits and farm crops. Our experience first, last, and always, tells us to apply to the surface, and cover slightly by the use of the harrow or rake, and shade from the sun and wind, while the crops are young. Lime and alkaline salts, they being dissolvents of organic matter, should be added in small quantities at the same time and way, but never to the pile. Farm and fruit crops may be successfully grown by the sewage and night soil alone, if the foregoing is properly carried out. A top dressing in the fall to lawns and fruit trees give a marked effect. By a light dressing several times in a season, and the ground aerated with a dagger-blade hoe, the very best results have been attained in the cultivation of small fruits.

With the foregoing outlines, and with adequate judgment for a guide, the same is equally well adapted to all situations, from the village lot to the proper sized farm.

Were we in search of a well-to-do household, occupying one of earth's bright spots, where the golden hours of life were taken in, where luxury prevailed, where happy rosy cheeks gamboled, and spring birds chose their nests, the occupants having a fruit paradise, a little world all their own, such we should expect to find only where proper order and cleanliness were found.

A. R. SPROUT.

Mr. MEEHAN thought this subject one of the most important that can be introduced, not only to the fruit grower, but to the entire community. In Philadelphia alone, millions of tons of valuable fertilizing material are anually carried into the Delaware and Schuylkill, which the city would cheerfully turn over to the agricultural community for sanitary, if for no other reasons. Streams are being polluted and poisoned, and, not only in this country, but in all the civilized world, the subject is receiving attention, and means are being devised to utilize this great waste. In England, sewage farms were established, and attempts made to filter sewage, and apply it to agricultural purposes; but the soil, in a few years, became filled with fæcal matter, and the project was abandoned. Other methods have been tried in London and other European cities, but none, as yet, have proved entirely satisfactory. Was much interested in Mr. Sprout's paper, because it shows us how and where to begin. The question is whether such individual effort can be made universal.

Mr. **HILLER** agreed with Mr. Sprout as to best method of utilizing the sewage of the household; but thought barn-yard manure could be profitably used in some other ways. It is now generally admitted that the best method of applying barn-yard manure is to use it as fast as made.

Mr. **SATTERTHWAIT** thought no more important subject than this could be brought before the public; but questioned the advisability of discussing it before this Society.

The Chair suggested that before adjournment the hours of meeting in future sessions be agreed upon. After brief discussion, it was decided to commence morning sessions at half-past eight, afternoon sessions at two, and evening sessions at seven o'clock, P. M.

The following committees were announced by the chairman:

On Nomination of Officers.—Charles H. Miller, W. P. Brinton, J. W. Pyle, and J. L. Stichter.

On Fruits on Exhibition.—Casper Hiller, Joel V. Garretson, J. G. Engle, and E. Satterthwait.

Committee on Business.—E. Satterthwait, Thomas Meehan, F. F. Merceron.

Adjourned.

EVENING SESSION.

Mr. **MEEHAN**, of committee to audit account of Treasurer, reported that duty performed, and that the account, were found to be correct.

Mr. **MILLER** moved that subjects for discussion be taken up in regular order, as per programme; which was agreed to.

The first subject was

MODERN FRUIT-HOUSES.

By GEORGE D. STITZEL.

Many of the finest fruits naturally undergo speedy decay, and those most highly esteemed are often only to be enjoyed by those who produce them, and cannot be put in market except for immediate consumption. This decay has been found to take place most rapidly when the fruit is exposed to considerable or frequent changes in temperature. We know that certain kinds of grapes packed in saw dust were imported to this country from warmer climates. We found that unripe berries could be preserved in their natural state a long time in bottles or jars filled in with dry sand or sawdust, and the jars corked or sealed and placed in the ground a considerable depth to preserve an equable temperature. This method could be employed with many fruits as well as vegetables. Pears, the finest kinds of which are apt to rot immediately after maturity, were found capable of preservation for months by being closely covered in stone jars and kept in a cool place. Similar experiments revealed the fact that an evenly cold temperature was a reliable preventive of decay in fruit, and have led to the construction of the modern fruit-house.

The value and convenience of this quite recent improvement will be apparent when we consider the great advantage in keeping fruit until the next ripening season, thus enabling us to get the very highest prices for what we have to sell after the market has become bare of such fruit as has been kept in cellars, or shipped from other localities, besides the advantage of having it for family use all the year round. I may say without fear of contradiction that fully thirty-three per centum of all fruits stored in the ordinary way annually go to waste. This would of itself more than pay the interest upon the cost of a modern fruit-house. This is true of the apple crop of itself, and the same may be said of pears. I am satisfied that if pears are properly handled and put into the fruit-house until the market becomes bare of those varieties sold out of the orchards, twice the amount of money can be made out of them. They should be carefully picked when matured, but before too ripe, and they will improve in flavor when allowed to ripen fully in the fruit-house.

In this way such varieties as the Buerre Easter, Columbia, and Vicar of Winkfield, will keep until the following April. That many kinds of vegetables, berries, and stone fruit, can be preserved a greater length of time than in the ordinary way, has been demonstrated by the use of the fruit-house. Cider will also keep sweet much longer than when kept in cellars where the temperature is constantly varying. The temperature in a well constructed fruit-house can easily be kept within a variation of eight degrees, say between thirty-two degrees and forty degrees, and proper care should always be taken in regard to ventilation, as it is to this that we can attribute the main success in preserving the fruit. A refrigerator or fruit-house can be constructed at a very little cost, say from $250 to $500, that would admit of storing one thousand bushels of fruit. This would accommodate a half dozen neighbors, who might club together and erect one at their joint expense, or one of their number might build one and by a charge for storage of ten or twelve cents per bushel, receive more than the interest upon his investment, beside the cost of stocking it with ice.

A Model Fruit-House.

I will now describe a fruit-house built on a larger scale, having a capacity of four thousand bushels, which has been in very successful use for twelve years. It is fifty feet square, and built of stone, and is twenty-eight feet high. The fruit-room is on the first floor, and is eight feet high, with an enclosed space, four feet in width, on the four sides, filled with ice from above. The ice-house, proper, is on the second story, and is eleven feet high, which, with the spaces referred to, is filled with ice. There should always be at least one foot of saw-dust, or some other non-conductor of heat, between the ice and the outer walls. The floor must be water-tight, with pipes, or some other means of conveying the accumulating water to the ground beneath the building. The third story floor is about three feet below the square. This room is intended to secure ventilation, and should be covered with some non-conductive material, to prevent any heated air from entering the building from above. There is a room, or space, about three feet deep, below the floor of the fruit-room, which is filled from the surplus of unmelted ice that remains in the second story; and this must be done before stocking with fruit, in the fall. Ventilation is secured through four box ventilators, twelve inches square, leading, from the fruit-room, through the ice-room, and extending into the vacant space above the third floor. These box ventilators are provided with valves or stops, by means of which the temperature in the fruit-room may be easily regulated. The fruit is stored in common boxes, containing two bushels each, the bottom of one box forming a cover of another; and these boxes are piled in tiers or sections, with spaces between to admit of passage and free circulation. Access to the fruit-room is secured through a kind of vestibule, with outside and inside doors, both lined with non-conductive material; hatters' waste wool has proven an excellent non-conductor for this purpose. The two doors, an inner and an outer door, are necessary to prevent the admission of air when persons pass in and out.

What It Cost—Other Refrigerators.

The cost of this building, when erected, was about $2,000, and it requires about one thousand tons of ice to fill it properly, about two thirds of which is annually consumed by the heat. Ever since the completion of this building, it has been used for the storage of various kinds of fruits, and has proven an entire success, and the owner has realized a handsome profit upon his investment.

There is another large refrigerator or fruit-house, in Reading, that is constructed upon a somewhat similar plan, which has been used for preserving tropical fruits and storing eggs, &c., for which purpose it has proven very successful.

There is still another large refrigerator or fruit-house in this city, quite recently completed and stocked with ice, which will be ready for the storage of fruits, &c., the coming season, and which will prove a great convenience to fruit growers as well as consumers of this place.

At the conclusion of his essay, Judge STITZEL called the attention of the society to his specimens of fruit from the preserving house, most of which were still quite green. Mr. Shearer picks his Bartlett pears when green, places them into his fruit-house, and brings them into market when the glut and low prices are over. A few farmers or fruit growers could club together and build a very serviceable house for $500, or even $300. Rambo's and Pound apples are among the longest keepers. The average temperature is about thirty-six degrees.

Mr. SATTERTHWAIT inquired whether moisture did not injure the fruit, and how it was avoided or counteracted?

Judge STIZEL thought ordinary dampness or moisture not injurious, but dripping water must be avoided.

Mr. STEVENSON. Will not the introduction of warm air cause moisture?

Judge STITZEL. That is obviated by the use of a vestibule or double doors.

Mr. HILLER did not think that moisture was injurious, from the fact that he used to keep apples in good condition until spring in his spring-house. A regular, even temperature is the most favorable condition for the keeping of winter fruits.

Mr. HILLER read a brief, but practical, paper on

THE APPLE.

The apple used to be our most valued and reliable fruit, but during the last twenty years it has become somewhat unsatisfactory. This does not apply so much to quantity as to quality of the fruit, for in most years we really have more apples than we know what to do with. If the quality was right, we could supply our home market, which is now supplied with thousands of bushels of New York apples. This deficiency of quality is attributed by many to insect depredations, such as borers, codling moths, caterpillars, curculios, &c. Others attribute the deficiency to worn out soil, potash, phosphoric acid, &c., mineral elements that the apple requires, having become exhausted.

Again, others think varieties have degenerated, &c. But these various theories are once in a while put sadly to fault, by having a crop of apples equal to old time experience. This deficiency in our apples should probably be attributed more to the dry and hot summers which we had for some years past, than to any or all of the above supposed causes. Our early apples—Early Harvest, Red Astracan, Benoni, All Summer, and Jeffries, are very little inferior to what they were in former times, but the later varieties do not fill out well, ripen prematurely, and consequently have so little keeping quality, that when winter comes we have no apples.

If drought and heat are the cause of this, we will find ourselves, to a great extent, helpless. Deep cultivation, good manuring, mulching, and location of sight will aid us much. The location of orchards will be our chief reliance. I found, last fall, where orchards had fine thrifty apples, they grew invariably in rather heavy clay loam, and were on low ground. One had a small stream of water running through it, not over two or three feet deeper than the surface. Here the Smokehouse apple was very fine, while on hilly, gravelly land, they rotted, and fell off the trees before September.

The lesson we have from this, would appear to be, that if these hot and dry summers continue, and we desire to have winter apples, we will have to select swamps for sites of orchards, and drain them to the right mean, which means not very dry. Apple trees bear much more water than many persons are aware of. The best orchards we have are situated on low ground. I think if we would grow winter apples, we will have to select swampy land, and drain it until we have the right medium between wet and dry. Apple trees bear much more wet than many are willing to admit.

Respectfully submitted.

CASPER HILLER.

Mr. SATTERTHWAIT hoped the essay would not be passed by without discussion, as he could not agree that low, damp soils are essential to successful fruit culture. Don't think that stagnant water or moisture will agree with any fruit tree, though such soils, after being drained, will do. Has had quite an extensive experience in fruit culture, and finds that in Pennsylvania the one great difficulty is the "codling moth." There are other insect enemies, but this, with him, is the leading one. Another great pest of the apple tree is the borer, which, of recent years, is quite destructive. Half, or even more, of those who plant apple trees, allow them to be destroyed by the borer. Has generally been able to guard against the attacks of the borer, but Codling moth seems more destructive every year. Of one thousand bushels of apples, don't think there was one but had moth in it. Would like to hear of some cheap and practical remedy for this enemy. To destroy the borers, he has a man follow his apple and quince trees latter part of May or early in June, and throw up a mound of earth around each tree. The eggs are then deposited high up in the trunk, and in August they can easily be found and destroyed with a knife. They must be promptly followed up, as they will soon work their way down and deposit their eggs. It is not necessary to bank up more than six or eight inches, and the work is easily and rapidly done.

Mr. **HILLER**. Have no apple borer where I live, but about six miles further north have some trouble starting orchards. We save our peach trees by tying paper around the trunks. Find it less trouble and labor than earthing up.

Mr. **SATTERTHWAIT**. There is not much difference in results, but thinks banking up takes less time than tying with paper.

Dr. **FUNK** finds that exposure has something to do with the work of the borer. On a south-eastern exposure a great many were found, while on a north-western exposure, in an orchard of four hundred trees did not find a dozen.

Mr. **STEVENSON** has had similar experience. On a north-western exposure has seen but few borers. Has applied a wash of linseed oil and flour of sulphur with good effect.

Mr. **SATTERTHWAIT**. We should commence in August, and examine the trees every month for two or three months.

Mr. **HILLER** don't fear insects as much as some. Heat and drouth seem more destructive than insects.

Judge **STITZEL** knew a gentleman who used pine tar very effectually. Whitewash used on peach trees generally prevented the ravages of the borer.

Mr. **STEVENSON**. Coal tar is poisonous and should never be applied to trees. It is sure death. Knew a gentleman who used coal tar to keep wood-chucks from his trees, and lost them all.

Mr. V. E. **PIOLLET**, four years ago bought one thousand peach trees from Delaware. Cut off all the branches and cut them back to a uniform height. Dug holes six inches deep and two feet in diameter, and put in a bushel of coal ashes for each tree. They all grew finely, and borers have not attacked them. Thinks there is no better fruit district in Pennsylvania than Bradford and Tioga counties.

Mr. **REIST** though forests had some influence on insects. As forests decrease insects seem to increase.

Mr. **LINT** thought the increase of insects the past few years was due to the long and dry summers. If seasons are short fewer insects come to maturity.

Adjourned.

MORNING SESSION—THURSDAY.

The first business of the morning session was the report of the committee on nominations. Chairman Charles H. Miller, in behalf of the committee, submitted the following list of officers for the ensuing year, who were unanimously elected:

President.

JOSIAH HOOPES, West Chester.

Vice Presidents.

H. M. ENGLE, Marietta.
GEORGE D. STITZEL, Reading.
JOHN I. CARTER, West Grove.

Recording Secretary.

E. B. ENGLE, Marietta.

Corresponding Secretary.

W. P. BRINTON, Christiana.

Treasurer.

GEORGE. B. THOMAS, West Chester.

Mr. SATTERTHWAIT then addressed the Society on

DISEASES OF THE PEAR.

Has had considerable experience with the pear, and intended writing out his remarks, but did not have time.

This fruit is not so subject to the ravages of insects as some others. The curculio and codling moth injure it some, but not to any considerable extent. Early Catharine seemed more subject to insects than any other sort. "Cracking" is another disease, and some varieties, especially White Doyenne, are particularly subject to it. Some think this variety is "running out," but is not convinced that there is any foundation for this theory. Of late it has been doing better than formerly. Another disease, caused by moisture or atmospheric influence, is a kind of mildew. Among those most affected by this disease are, Buerre Clairgeau, Napoleon, and Buerre Capiamont. These are always most affected in wet seasons, and in dry seasons are comparatively exempt.

The chief insect troubles of the pear are those which affect the tree. It is usually exempt from the borer, unless grafted on the quince.

The slug is the most destructive insect affecting the tree. It is a small slug or worm, from one quarter to one half inch long, and generally appears suddenly in June. Dust, ashes, slaked lime, or any dry fine substance will destroy them. Whale-oil soap is also a remedy.

Probably the worst of all diseases of the pear is leaf blight. Most varieties are, more or less, subject to it. Suddenly, after the fruit is half grown, or just beginning to ripen, the leaves will turn yellow, and the crop is ruined. There are several theories as to what causes blight; but, in his opinion, it is caused by the excessive heat and drouth of our summers. The following sorts blight badly, and he would reject them entirely: Tyson, Flemish Beauty, Canandaigua, and Washington. Some consider fire blight most destructive, but, in his experience, leaf blight is worse. Has lost some two to three thousand trees out of five thousand, by this disease alone. Most of these were killed after they came in bearing, so the loss is a serious one. Knows no remedy for leaf blight, and can only recommend the planting of such varieties as are least affected. Has cultivated some six hundred varieties of pears, and would classify the leading varieties as follows:

REJECTED LIST.—Varieties most subject to blight: Osband's Summer, Dearborn's Seedling, Madeleine, Onondaga, Belle Lucrative, Vicar of Winkfield, Buffum, Ananas d'Ete, Maria Louise, Glout Morceau, Ott, and Golden Buerre of Bilboa.

Rejected as liable to blight: Tyson, Flemish Beauty, Canandaigua, Washington.

Subject to leaf blight to some extent, but indispensable: Seckel, Bartlett, Rutter, D'Anjou, Lawrence.

Blighting some, but desirable in a large collection: Doyenne d'Ete, B. de Montgeron, Clapp's Favorite, St. Michael Archangel, Howell, Manning's Elizabeth, Doy Boussock, Des Nonnes, Kirtland Buerre Bosc, Cushing.

Almost entirely free from blight: Duchess, Buerre Giffard, Doy Rose, Jefferson, Meriam, Julienne, E. Catharine, Kingsessing.

Judge STITZEL is satisfied that blight affects varieties differently in differentdifferent localities. Some of those named as blighting badly with Mr. Satterthwait, do not blight here. Among these is Vicar of Winkfield, which is almost free from disease.

Mr. LINT has had some trouble with bark blight. Can usually save his trees by scraping off the outside bark with a knife.

Mr. SATTERTHWAIT. This is only a mild form of fire-blight.

Mr. GEORGE K. LEVAN has had but limited experience with pears. Vicar of Winkfield has succeeded best with him. Is not troubled with fire blight. Cannot grow plums successfully.

Mr. SATTERTHWAIT. Glad to hear the experience of others. With him, Vicar blights as badly as any.

Mr. GARRETSON finds Vicar fully as hardy as Duchess.

Mr. MERCERON has lost all his Vicars but one that stood in the sod. Has never lost a Seckel by blight.

Mr. HILLER had considerable experience, but has learned nothing. Has no remedy for blight. Has had trees destroyed in a day, when fruit was nearly ripe. In Lancaster city there is but little blight, and fine pears are grown in house yards and lots. Considers Manning's Elizabeth the most valuable pear in his collection.

Mr. STEVENSON inquired whether blight was contagious. Some observations have convinced him that it is. Has a neighbor who has lost nearly all his trees. Has noticed also mountain ash near blighted pear trees, that were similarly affected.

Mr. SATTERTHWAIT does not think blight is contagious.

The further discussion of this subject was postponed for the present, and the following essay was read:

MULCHING AND ITS BENEFITS.

By ALEXANDER BURNETT.

MR. PRESIDENT, LADIES, AND GENTLEMEN OF THE PENNSYLVANIA FRUIT GROWERS' SOCIETY: In coming before you with the subject of "Mulching," I beg of you not to expect great things of me, as I lay little or no claim to a knowledge of the sciences. Born and raised on the farm, I have ever been but an humble tiller of the soil in one capacity or another, hence the reason of my choosing this simple subject; yet, simple as it may at first sight appear, it is, nevertheless, one of vast importance to every cultivator of the soil, no matter in what form.

By the term mulching, then, we mean the applying of any loose material to the surface of the ground, by which the moisture contained therein is prevented from escaping during dry times, whether in summer or in winter. And in proportion as this is well done, so, in like proportion, will the living plants be benefited, whether it be in the farmers' grain-field or in the fruit growers' orchard. So in whatever way this can be accomplished, effectually and most economically, is what we now intend, briefly, to speak of.

The mulching material may be of any loose material, handiest to be obtained in each one's own neighborhood; such as stable manure, straw, spent tan bark, leaves, saw-dust, &c. One of the very best mulching materials, with which I am acquainted, is a marine vegetable, generally known by the name of *sea-weed*, washed up by the tide, and, generally, to be had in abundance along the bay shores. And, wherever this is to be had, the husbandman will do wisely in availing himself largely of it, as it is a fertilizer as well as a mulcher. I speak from experience, of this most excellent material. The grass and rushes obtained from the marshes, would, no doubt, be found equally good.

In regard to the practicability of mulching, I will be told that with the gardener, in his comparative limited way, it may be done, but how with regard to the farmer and fruit growers, with their broad acres? Can they mulch upon general principles? I answer, that even they have it in their power to do much in this particular. If they cannot cover their corn and potato-fields with the materials spoken of, they can keep the surface soil constantly and thoroughly pulverized, by the use of the cultivator, among the growing crops, to the latest possible moment; and this is mulching in an eminent degree. Indeed, any device which may be adopted, by which the moisture is retained among the roots in the ground in dry weather, is mulching. And a constant stirring of the surface soil is an excellent substitute, when followed by a deep and thorough cultivation in the first place. But to this *first* preparation, I beg here to say there is too often not enough attention given. It is a well known fact, that dessication goes on much more rapidly through a hard, smooth surface soil than it does through that of a porous one, and hence the advantage of keeping the surface soil loose and porous.

The fruit grower has equal chances with the farmer and others, by which he may pursue the mulching principle, by pursuing the constant, persistent system of keeping the soil among his trees, bushes, and plants loose, the season through. Even the advocate of grass orchard culture has it in his power to do much in the way of mulching. For instance, the grass crops, of whatever kind, might—yes, I should say—*ought* to be left upon the soil to decay there. This, together with liberal top dressings of manure, will go far in the way of mulching, and will be found to *pay* better in the long run than does the beggarly practice of all off and nothing on, which is but too commonly the course pursued by many.

Paradoxical as it may appear to some, it is nevertheless a fact, that stones laid on in liberal quantities around each tree, to a considerable distance all round, and a little *under* the surface, will be found to be of great benefit in the way of a mulching, as they are powerful retainers of moisture.

From these hints the wide-awake and persevering cultivator will readily see a large field around him wherein to exercise his lalents in keeping his ground, in summer, from becoming parched. Deep and thorough breaking up of the soil to begin with, and this, whether mulching is to be applied or not, will largely overcome the evil effects of our hot and dry seasons.

So far, I have been alluding to our summer weather. Now what can be said with regard to *winter* mulching. Here is a season when not only the farmer, fruit grower, and gardener, but *every* person owning a plot of ground containing some favorite plant or bush, becomes solicitous about them. To those I would say, leave your summer mulching on, wherever practicable, and yet add more to it, if possible. It will prevent the frost from penetrating the soil so deeply, the evil effects of which is often more destructive than is that of the scorching summer's sun. We all know how anxious the farmer is to see his grain fields covered by snow, and how healthy and green the crops are in the spring, after this, nature's own mulching; and if the grain and grass is benefited thereby, so also are trees and shrubbery, especially evergreens. No doubt it is within the recollection of many here to-day how destructive the weather of 1871 and 1872, if I recollect right, proved to be to many of our native evergreens in this part of Pennsylvania, when the cold was intense, and with the ground bare of snow. You will remember that on the following spring the usually hardy red cedars, as well as many other things, could be counted by the thousands standing out upon the hillsides, *dead*, totally killed, and from not having been provided with nature's mulching, snow.

This was proved most conclusively, from the fact that although the following winter was equally as cold, the ground was well protected by a deep covering of snow, and as a result we did not, to the best of my recollection, lose a single tree or shrub. I had good reason for making a note of this, for in the Charles Evans cemetery we lost over *two thousand* trees and shubbery, largely in hedging of America arbor vitæ, and the fatality was confined mainly to trees standing upon dry and shallow soil, proving to my mind that our troubles were brought about from the want of *root* protection, every particle of sap having been abstracted from the ground by the frost, and, as a result, the roots had none to supply the top of the plant with, and the system soon became exhausted by dessication, resulting in death, and all for the want of a good *winter* mulching.

Now let me say again, in conclusion, that the question of protecting the roots from being *robbed* of their moisture, either by the summer heats or by the winter winds, becomes a question of vital importance to every cultivator of the soil, whether he be fruit grower, tree grower, or the farmer with his broad acres. In their several capacities they are all able to do much in this direction. One thing should ever be kept in mind, and that is *first* principles—deep and thorough cultivation of the soil to begin with, which will go far to compensate for the want of *mulchings*.

Mr. SATTERTHWAIT. A very valuable paper, but was sorry the author did not give some figures as to the cost of mulching.

Had mulched last season one third of an acre of asparagus with five tons of salt hay, at a cost of seven dollars per ton. Mulched thickly, so that weeds could not come through.

Mr. BURNET. In regard to the expense of mulching, that would depend upon circumstances. To mulch effectually, it should be put on thick enough to prevent evaporation.

Dr. FUNK thought in mulching so heavy there would be danger from mice.

Mr. MILLER thought fifteen tons to the acre was an enormous mulch. The essayest spoke of stones, and he thought no better and cheaper material could be had. They condense moisture, check excessive evaporation, and help to keep trees in place. Leaves, also, are good mulch. Never plants young trees without a mulch of some sort.

Mr. CHASE. Last spring planted ten acres in apples, peaches, pears, and plums. Soil very thin, and about a bushel of charcoal and rotten chip dirt was applied to each tree as a mulch. Scarcely lost a tree, and its good effects are expected to continue several years.

Mr. MEEHAN. Experiments made by Boussingalt some ten years ago, demonstrated that plants could not well endure a higher temperature than seventy-five degrees in the soil. Has made experiments himself, and was astonished to find the temperature sometimes as high as one hundred degrees one foot under ground. The earth is frequently warmer than the atmosphere, and it was discovered that certain fungii never germinate at a lower temperature than seventy-five degrees. Mulching keeps the earth cool, and plants thus protected are kept cool also. It was this fact that suggested to him the idea that grass or sod would be a protection to his fruit trees. In grass, the temperature seldom rises above eighty degrees. There is no advantage in grass as a mulch, if other materials can be had to keep the ground cool. In the vicinity of Boston, we seldom hear of "leaf blight," or "crack" in the pear, and this is, no doubt, due to the fact that their orchards are covered with sea-weed. So with foreign varieties of gooseberries, which can be successfully grown by mulching with stones, weeds, or any rubbish that will keep the roots and earth cool and shaded. Winter mulching, also, is beneficial, because it arrests evaporation. The sap of trees never freezes; but they are often killed in winter by excessive evaporation, as in summer.

Mr. HILLER inquired about the Reading pear, and asked whether it could be grown out of the city.

Judge STITZEL. It has not been grown outside of the city for many years. Suggested that the peach be the next subject considered.

Dr. FUNK thought apples a more important topic for discussion, and it was accordingly taken up, including varieties, cultivation, and diseases.

Judge STITZEL read list of varieties recommended by Berks County Agricultural Society for cultivation in Berks county. Stated that Baldwin comes nearer perfection here than any other of the New York winter varieties.

Dr. FUNK. In lower end of county Smokehouse and Baldwin amount to nothing. Our best varieties are Krauser, Cole, Hays, and Smith's Cider; for early sorts, Red Astrachan and Early Harvest; for fall, Maiden's Blush.

Mr. LINT. Baldwin does well with me.

Mr. BARTRAM has twenty-five trees of Hubbardston, which bore for first time this season, but fruit nearly all rotted.

Mr. STEVENSON thought the proper way would be to take Pennsylvania varieties northward.

Mr. CHASE is planting York Imperial in Monroe county, New York, but has not fruited it yet.

Mr. STEVENSON. Rawle's Janet has failed entirely with me. It is small and worthless. Our best sorts are Baldwin, Greening, Spy, and King.

Mr. MERCERON recommended Ribston Pippin.

Judge STITZEL. Smokehouse is one of the best varieties here. It can be used early and will keep into winter. Tree, a very crooked, irregular grower when young, which may account for its not being more largely planted.

Mr. SATTERTHWAIT considered Smokehouse one of the best flavored apples known.

Mr. MEEHAN received, some ten or twelve years ago, a box of apples named "Printz," which he thought the finest flavored he had ever seen. It was a high colored beautiful fruit, and an annual regular bearer. Asked whether any one present had any experience with it.

Mr. GARRETSON has fruited it. Finds it a good bearer, but rather acid for eating.

Dr. FUNK asked for information concerning Ben Davis.

Mr. HILLER. A good keeper, but ordinary in flavor.

Mr. BARTRAM. Summer Hagloe is our best early apple. Does much better than Red Astrachan, which is inclined to rot.

Mr. CHASE. In New Jersey, Hagloe seems to play out and is being superseded by Duchess of Oldenburg. Have seen this variety grow from Maine to California, and does well everywhere.

Mr. **HILLER** named Dominie and Griest's Winter as good winter keeping varieties with him. Griest's Winter is a York county apple. Krauser is also a profitable variety; quality good, but the skin is tough.

Mr. **ZERR.** Krauser is an excellent bearer, and, when in season, is an excellent fruit.

Adjourned.

AFTERNOON SESSION.

The selection of a place for the holding of next annual meeting was considered. Bethlehem, York, Gettysburg, Harrisburg, Philadelphia, and Allentown were named.

Colonel **STICHTER** thought populous centers should be chosen, and suggested Philadelphia.

Mr. **ENGLE** stated that several of the best meetings the Society has ever had, were held in smaller towns. Mentioned Chambersburg and Mechanicsburg, to prove his assertion.

Mr. **THOMAS** did not think it best to meet in the large cities. Thought Bethlehem suitable, as we have not been in that section of the State for some years.

The places named were subsequently withdrawn, except York, Gettysburg and Bethlehem, and, a ballot being taken, the last named was chosen, and on motion of Judge **STITZEL**, the vote was made unanimous.

Mr. **THOMAS MEEHAN** made a verbal address on

PROFIT AND PLEASURE IN HORTICULTURE,

of which the Secretary made the following notes: "Some twenty years ago a few gentlemen interested in horticulture met in Lancaster city, and organized the Pennsylvania Fruit Growers' Society. It could with propriety have been called a *Horticultural Society*, but as there already existed a 'Pennsylvania Horticultural Society' in the city of Philadelphia, it was thought best to adopt the title of 'Fruit Growers' to distinguish it from its sister society.

"In other States fruit growers' societies were also organized, but after a time it was discovered that this name did not represent the objects in full of the several organizations, and most or all of them have since been changed into 'Horticulture' or 'Pomological' societies.

"A few years since it was proposed also to change the name of this society, but when the question was discussed several difficulties seemed to be in the way. In the first place, the society had gone to considerable expense to engrave a lithograph plate for its members, which would be useless in case its name was changed. In the second place, the Legislature has provided for the publication of our annual reports, as a part of the State agricultural proceedings, and a change of name might involve us in difficulties in that direction; so it was thought best, at present, to have the name of the society as it is. So in practice, if not in name, I am in order for introducing a horticultural topic, as an incident in a fruit growers' meeting.

"In noting my proposed addressed a newspaper gave it as 'Pleasure and Profit,' and a country farmer recently told me he thought this was putting the cart before the horse, for that profit should stand before pleasure. 'We have,' said he, 'to scratch for a living first, and after we have made a living, we can have our little pleasure grounds and gardens.' But the speaker said the newspaper, though misquoting the title, was not far wrong, for, in the language of his Montgomery county farming friend, a man was but 'a poor shoat' who took no pleasure in his business. It was this particular pleasure that he chiefly had reference to, and if we looked around us we should see that almost all our successful business men in horticulture and agriculture were those who had loved it against all odds, rather than those having any special opportunities of studying their business.

"'Here, before me,' said the speaker, 'I see our worthy ex-President Satterthwait, whose success, financially, and by intelligent reputation, is all he can desire; yet, if I am not much mistaken, he was educated to mercantile pursuits, from which pure love for horticulture stole him, [a nod of assent from Mr. Satterthwait;] and there is your equally famous President, Josiah Hoopes, in the same predicament. Here, also, before me is the consulting landscape gardener of Fairmount Park, Mr. Charles H. Miller, whose taste in ornamental gardening is so well known. He was always an excellent gardener, as gardeners go; but his love for true taste and designing led him on and beyond, as I happen to know, till he reached the eminence he now enjoys.'

"Some years ago, a gentleman in Springfield, Massachusetts, kept a small drug-store. The culture of flowers and seeds gradually took him from his drugs, and to-day Mr. B. K. Bliss is known all over the United States as a prominent seedsman and florist.

"Mr. Vick, of Rochester, New York, was not originally what he is now, an enthusiastic florist and gardener; but he eventually gave up all else, and devoted his entire time to his favorite pursuit. So in Philadelphia, those who have made the greatest mark in horticulture are not those who were raised to it, but those who chose it because of the pleasure and satisfaction it afforded them. Of such, Mr. Dreer and Mr. Graham were conspicuous examples."

He pointed out, by various illustrations, that all persons love flowers and gardening in some form or other, even if they say they do not. The love of beauty is inherent in all civilized beings, and this faculty seems to be the distinguishing mark between man and the brute creation. There is an immense number of amateur horticulturists, who could derive great profits from their horticultural labors, but who never sell, and are amply repaid in the pleasure and satisfaction they receive.

But I am not one of those who consider money profit an evil. If the acquiring and saving thereof could be taught in our Sabbath schools and churches, we would be the better for it. The disposition to undervalue money is the cause of much evil in this world as well as is the over desire to possess it, and I do not blame those horticulturists who also are interested in its monetary aspects. I am frequently asked "what is the best kind of fruit for profit, and how can the best results be realized? Much depends upon circumstances, such as soil, location, a steady and regular market, and business ability. Certain fruits and vegetables are always in demand at paying prices, and in our cities can be found a large number of persons who are ever ready and willing to pay a fair price for the finest fruit and vegetables if they can only be had. When, where, and how to market is a most important question, and could be made the subject of interesting and extended remarks.

Mr. HILLER. There is nothing to dissent from in Mr. Meehan's views. Even in case of failure, gardening is not without its pleasures.

The Committee on Fruits on Exhibition submitted the following report:

By **Joel V. Garretson**—Two plates apples: York Stripe and York Imperial—good keepers.

By Colonel **J. L. Stichter**—Six plates apples: Keim, Baer—fine, appears to be a good keeper, Small Champagne, Reinette, Dumpling, Palm—pronounced Ridge Pippin.

By **J. Hibberd Bartram**—Two apples for a name. Pronounced Peck's Pleasant.

By **H. M. Engle & Son**—Twenty-one plates: York Imperial, Saylor, Red Rambo, Northern Spy, Red Streaks, (Ohio,) Bailey's Sweet, Red Russet, Hubbardston's Non-such, York Imperial, (Ohio)—not true to name. Pittsburgh Pippin, Seek-no-Further, (Ohio,) Winter S. Paradise, White Vandevere, Robinson, (good,) Gloria Mundi, Rambo, mixed apples from Ohio.

By **Ezra High**—Hubbardston's Non-such, Phillippi.

By **Levi Scarlet**—Magnum Bonum, (from Michigan.)

By **L. S. Reist**—York Imperial, Millport Sheepnose, (said to be a good keeper,) Rhode Island Greening, Golden Pippin, Baldwin, Northern Spy, Rox Russet, English Russet, Hubbardston Non-such, Greist's Winter, Lancaster Greening, Fallawater, Smokehouse.

By **Michael O'Neall**—Morris Sweet, (seedling, excellent.)

By **S. Stevenson**—Clark, (seedling, worthy of trial.) Mon Pippin. One variety for name.

By **George D. Stitzel**—Six plates fine apples from preserving-house.

By **John C. Hepler**—Hepler, Krausers.

By **Peter Lint**—Baldwin, Smokehouse, Maiden's Blush.

By **Charles Downing**—Old House.

By **Calvin Cooper**—A seedling from Lemuel Chew.

By **James Jameson**—A variety of choice apples.

Pears on Exhibition.—Judge **Stitzel**—Vicar of Winkfield, Gluot Morceau, from preserving-house.

A. K. **Kline**—Reading pear—very choice.

J. L. **Stichter**—Reading pear.

J F. **Moens**—Reading pear.

Levi Moyer—Reading pear.

J. **Rambo & Son**—Easter Beurre.

Submitted by committee.

CASPER HILLER.
JOEL V. GARRETSON,
JOHN G. ENGLE.
E. SATTERTHWAIT.

On motion of Mr. **Brinton**, the following paper was read:

ORCHARD CULTURE.

By **George Balderston**, *Cecil county*, *Maryland.*

In this brief paper, we propose to discuss a few points only in relation to fruit culture, and shall confine our observations mainly to the Middle States, and to apple growing here, and not attempt to fathom the mysteries of the "fire blight" in the pear, which has no connection with the present subject. There should be a distinction made when speaking of culture, to indicate the locality or kind of soil and the variety of grasses that are indigenous to the place. Many sections of our widely-extended fruit belt do not and cannot produce what would be termed a sod in other sections. When there are no perrennial grasses, a sod, in the local application of the term, does not exist, however much the annual grasses or weeds may grow. So in speaking of the absolute necessity for culture to enable us to produce fine fruit in paying quantities, we would be understood as speaking for this favored locality, where fields are nearly always clothed with verdure of nature's planting, when man has not interfered, or supplied the seed for the special grass or grain he may wish to grow. The reason for making this distinction may be apparent when I say that I saw none of our green-grass or timothy sod in a pretty close scrutiny of the famous orchard region of western New York, so that if no cultivation is sometimes allowed there, without apparent immediate injury, it is no safe precedent for others whose orchards are completely sod-bound in two or three seasons.

Clean Culture and Manuring—Their Rule.

But so far as observation went, and in conversation with the most prominent fruit-growers, it seems that clean culture and manuring is the rule, and the reverse the exception, and the most productive and healthy orchards were there tended with all the care of a garden. In treating of culture of fruit trees we may as well commence and give a few of the arguments pro and con., and note the effects of clean summer culture on the growth of trees, both wood and fruit. We may here remark, by way of parenthesis, that a strong and vigorous growth of wood is not always productive of a corresponding fruitfulness, but often seems for the time to hinder it. We have not yet found the person who has failed to notice the effect of culture in promoting a growth of wood in young orchard trees, and hence there is no division of sentiment, or very little. as to the propriety of plowing your orchards. But many of our pomologists are now recommending the seeding of orchards to grass after this, and why? Some say to induce early bearing, and others that it is the right way to do; while a much larger number fall very easily into the practice when the spaces between the trees becomes so well shaded that they will no longer pay for labor bestowed on hoed crops, like corn or potatoes. With the great majority of farmers in all the Middle States, the apples have been considered of very small impostance. A home supply only is aimed at, and if they fail to have even these more than half the time they are content to do without, and can always find plenty of reasons to which to assign the failure of the apple crop.

Fruit Cultivated in Grass.

To these, the theory that fruit can be successfully and profitably "cultivated in grass" come with a very soothing influence, and they remain content where they are, and readily adopt the notion that fruit growing is a failure in their locality, because they have failed to find the profitable part of it. Those who maintain that this is the right way to do, have also some theory at the bottom of their practice. The theory is that the roots of a bearing tree should never be disturbed, and that any cultivation after trees have attained a bearing age is an injury to them. This may sound very plausible and there is, no doubt, some truth in the idea, and in order not to be misunderstood it becomes necessary to look into this subject more closely than a mere casual glance would give. The roots of a tree may readily be divided into two distinct clasess, each having its own special function. In the case of the apple we find that all the large roots have a thick succulent bark and a hard woody structure. These are the main supports of life and the reservoirs in which the sap seems to be stored for the use of the tree, and are also the arteries for conveying it to and from the trunk and leaves.

The reserved vitality of these roots renders them capable of withstanding considerable exposure to the atmosphere, as when a tree is removed and then continuing growth when again brought in contact with proper conditions. They are also capable of an independent existence when severed from the parent tree, and in the apple they will grow quite freely and make a new top under favorable treatment. They generally penetrate the earth rather deeply, and thus hold the tree in its upright position while doing the other duties mentioned. These main roots perform their functions by the aid of the second class, or thread-like filaments that spring from them whenever they are needed, and make a perfect net-work in the soil above or about them. A good specimen of these capillary roots may be found where a tree is growing near a drain or water pipe, as some of us know, to our cost, when said pipe has been completely choked up by them. These rootlets are to the large roots just about what the leaves are to the branches. They are of annual growth and never increase in size, and, in fact, they often decrease as they grow, (the first of their existence,) the tip being heavier and stiffer on these threads than the mature rootlet. They contain no woody structure, and are incapable of standing exposure to the atmosphere for more than a very short period.

Their destruction from any cause is a check to growth in just about the proportion that the removal of leaves would be. We that have, in our ordinary business, to handle plants in all stages of growth, soon learn to know their names and requirements. A small amount of growth can and does take place from the main roots without these feeders, and until they are formed by absorption through the bark; but the main and subsequent growth is by their aid. They are not powerful enough to force their way in a very hard soil at all readily, and hence it is very desirable, if we would promote their growth, that we keep the soil in a mellow condition. With very small trees, the effect of culture is immediate in promoting vigor, and in large ones it soon shows itself. The first effect, in bearing trees, is to be seen in the growth of leaves and wood, and this, in turn, has a direct effect on the quality of the fruit. It does not require much experiment or observation to show that these feeding rootlets are mainly near the surface of the ground, and that the large roots are universally deeper, below the reach of summer sun and drought. Where the ground is heavily shaded or covered with leaves they will run nearer the surface. An excess of water below will also drive them up for air, for few trees can grow long with roots immersed entirely.

The Surface the Place to Feed.

From the surface is where nature has evidently designed all her vegetable productions to be feed. She does, indeed, water them from below to some extent, but the feeding rootlets cannot live deep in earth. Manure a a tree as liberally as you can, and then pile earth two feet deep on the surface, as far as the limbs extend, and note the result. We have seen many trees killed by a similiar process. This being the case, it is evident that any manure deeply buried must be of little benefit to us. An artificial air chamber of any sort will partly remedy the trouble, and enable roots to thrive below their natural depth. They must have some air as well as water. We then have an answer to the theory of those who oppose cultivation on the ground that it injures roots. The benefit greatly overbalances the jury in all ordinary culture where a plow and cultivators are used.

The plow is not to be run deeply close up to the butt of the trees to tear the large roots, and any careful driver will soon learn to regulate the depth of furrow on approaching a large tree, so as not to strike the main roots. A smaller one will be cut frequently, but its loss is nothing more than the pruning of a limb. 'Tis true a sod of rootlets is cut and inverted where an old orchard is plowed; but when this is done in the early spring, (as it is in all ordinary farm operations,) there is nothing destroyed, for the majority of these are the dead feeders of the previous year, and are of no more use than a "last year's bird's nest." We have a practical test and opportunity of knowing the character of these rootlets, fibrilæ, and spongioles, in handling young trees, and we know they are not persistent, but disappear from older roots as they grow.

To thoroughly plow and loosen up the surface of an orchard in early spring, is to give all the roots and rootlets a full opportunity to perform their functions, and, if a liberal application of fertilizers is applied and stirred in at the same time, a double good is done for the fruiting trees. Subsequent surface cultivation may possibly injure a few roots, while it benefits the growth of the many. In orchards long neglected, the large roots do come nearer to the surface than is desirable, but where frequently stirred there is no trouble with them. Here, then, is one good and sufficient reason for the culture of orchards, that the ground may be kept sufficiently loosened for the rootlets to grow readily through it, and to bring fresh supplies of nutriment within their reach. We object to the alternative of heavy surface mulching, to produce the same result. First, on account of the cost, and secondly, because it is next to an impossibility to do it, where large orchards are the rule. A mellow soil is much cheaper than swamp hay, fodder, or straw.

A few words now on the early bearing of fruit trees. As has been said, a fine growth of wood and as large yield of fruit are not to be expected at the same time. Ordinarily a fine growth of wood must precede a fine growth of perfect fruit. When the tree has attained a moderate development, fruit buds begin to be formed, and anything that causes a temporary check to the further development of wood, promotes their formation. The buds from which the apples are produced are of a previous year's growth. It is on this principal that the formation of a tough sod on a young orchard induces early fruitfulness, but it does it at the expense of the future life of the tree. If to make the grass a source of revenue be the primary object, the motive is worse yet. He cannot expect two perfect crops from the same ground at the same time; one must rob the other. As our object in growing orchards is the profit of the planter, it does not necessarily follow that the greatest longevity of trees is the object to be sought, and it seems more than probable that a condition of soil not the most congenial to producing trees of stately proportions, will nevertheless yield a greater revenue in fruit. And it is also the case in many varieties, that they are so given to exuberant growt has to be almost valueless. With many of our finest fruits the case is reversed, and it is quite difficult to secure growth enough to repair the annual waste. In our uncultivated orchards it appears to require several years to repair the exhausted energies of one general fruit season, and the Newtown pippin now suffers especially from this cause. Other and more thrifty varieties repair the waste in a single season, and this is the chief cause of alternate year bearing.

Mr. MEEHAN has experimented, and proved, to his own satisfaction, that apples can be grown in grass, and without cultivation. Eight years ago, planted an orchard, and for seven years have made, annually, an average of three tons of hay per acre. Found in no other way could I make so much money from it, with so little labor and expense. Away from the city, where hay is a drug, would probably find more profit in corn, or some other crop.

Judge **STITZEL** was in favor of cultivating orchards. In his travels through the county, had ample opportunities of seeing the marked advantages of orchard culture.

Mr. **EPPEHEIMER** could speak only from observations made with young trees. Every advantage in favor of cultivation.

Mr. **HERMAN STRECKER**'s essay on the "Moths and Butterflies of North America, in their relation to Horticulture and Floriculture," was presented, and referred to the Publication Committee.

On motion, the thanks of the Society were unanimously tendered for the labor performed.

The following paper was next read:

CULTURE AND TRAINING OF THE VINE.

By HENRY M. ENGLE, *Marietta*, *Pennsylvania.*

So much has been written upon this subject as to almost confuse the novice and contemplative planter into inactivity, for fear of doing more injury than benefit in attempting to follow the teachings of books which treat on vine culture. Between the close pruner and non-pruner lies a wide field with innumerable methods of training, that is not surprising that there is so much confusion relative to the growing of this important fruit.

Important, I say, because there is no fruit in the north temperate zone that can be made more a certainty, or will yield more weight from the same area, and upon almost any soil. The special advantage it possesses over all other fruits, however, is that it can be planted close to any building or wall, and trained up against it to any reasonable height, and where no other fruit can be grown. It can be trained over arbors where it will answer for shade also. Grapes grown in such situations, when properly trained, are generally more certain than vineyard culture.

The grape is a great feeder and will repay proper fertilizing very well. Young vines can be grown from single eyes or with two to half a dozen eyes; also by layering, but those from single are preferable, as they contain but little old wood and have the roots started from one point. For a vineyard the ground should be well prepared as for any other planting. The vines may be planted from six to twelve feet apart, according to variety and vigor of vine. Depth of planting should not be more than six inches, and with a little mulch added is better than a foot deep of soil. Cultivation should be as for all other plantings; the ground kept mellow and kept clean of weeds for three or four years at least, after which it is a mooted question whether to cultivate it or run it into grass. I am, however, on the side of continued cultivation, but shallow only. Good, well prepared soil will require no manuring until a crop or two has been taken off; after which don't expect to take more out of the soil than there is in it. I shall not discuss manuring now, as every planter should know what his soil and his crops require.

Training.

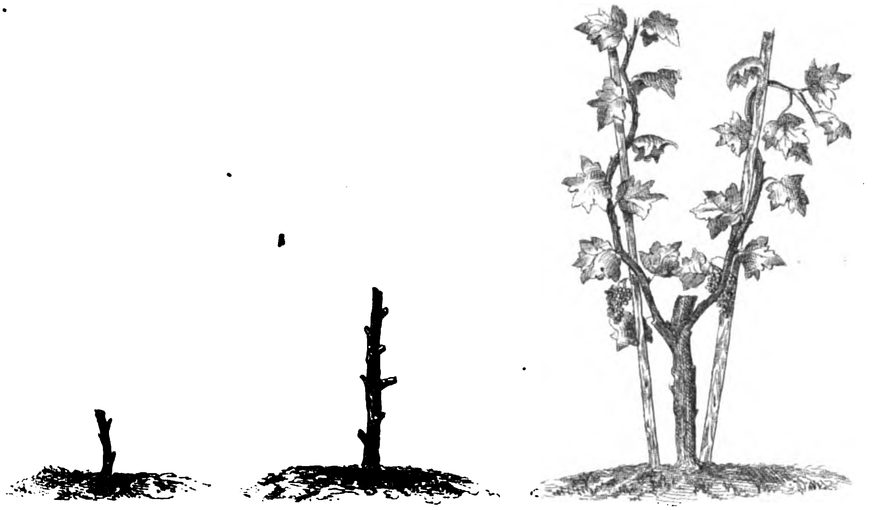
At planting, cut the vine to a few eyes, and after it starts to grow, pinch or rub all off but the strongest, which train to a stake four to six feet high, but do no cutting or pinching the first season. For the second season cut the vine to fifteen or eighteen inches above ground; set two stakes, six to eight feet high, one on each side of the vine; set obliquely, leaning apart, and train two of the highest and best shoots, one to each stake, and keep off all other shoots from the main vine. Vines growing obliquely will form shorter joints and develop the eyes more uniform than when growing upright. They will, however, force stronger laterals, which must be pinched off beyond the first eye, and if growing too strong thereafter, pinch off again, but do not break off the lateral altogether, as it often causes the eyes to push which are intended for next year's fruiting.

Trellises should be made for the third season. Posts driven in along the rows, about five feet high after being set, with a horizontal rail over the tops, and one about eighteen inches above ground to nail on slats or wire vertically, is the best form of trellis of which I know. These uprights should be seven or eight inches apart. I know of nothing equal to galvanized wire, about No. 16,) which is not only exempt from corrosion, but the vines can be trained to it without tying. The trellis being ready for the third season, prune off all laterals from the vines to a length that will reach half way to the next vine, and cut it off and tie to lower rail; bring the nearest cane from the next vine and treat the same way, and thus continue to the end of the trellis. You have now a basis upon which to grow your first crop.

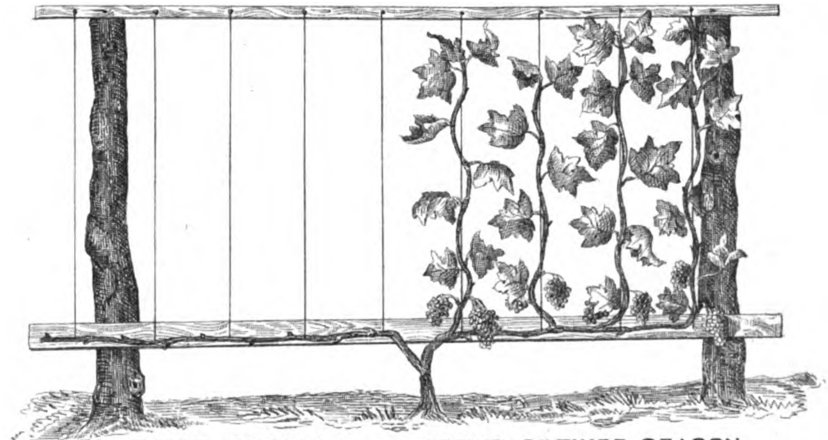
Training will now be in order as soon as the young shoots attain the height of fifteen to eighteen inches. Secure the nearest to each wire and break off all the rest. As soon as all the flower clusters are fairly out, pinch the shoot off, leaving one joint beyond the last cluster. This will check the strongest shoots, and give the weaker a chance to get even. The stronger should be pinched in during the season whenever they show too rampant growth.

I am well aware that this early pinching is contrary to the teaching of books, but experience has taught me that it is preferable to letting them grow until the grapes are as large as peas, and then pinch the three joints beyond the last bunch, as the books say. Early pinching checks the rapid upward growth, and causes the development of larger foliage, heavier vines, and fuller eyes near the base, which is an important point gained, as we shall see by and by. It must not be forgotten that the bearing eyes are on last season's growth only. For this reason it is important that with all methods of training, the object should be to have the eyes intended for next season's fruiting as well developed as possible. Each eye will, as a rule, produce a cane bearing three bunches of fruit, consequently, the upright vines are now bearing a crop and at the same time forming eyes for for the next (fourth) season's crop. The laterals should be treated as directed in second year's growth. Toward the close of the season the vines may be left to grow as they will. If we have now a well developed cane to each upright, the vineyard is fully established.

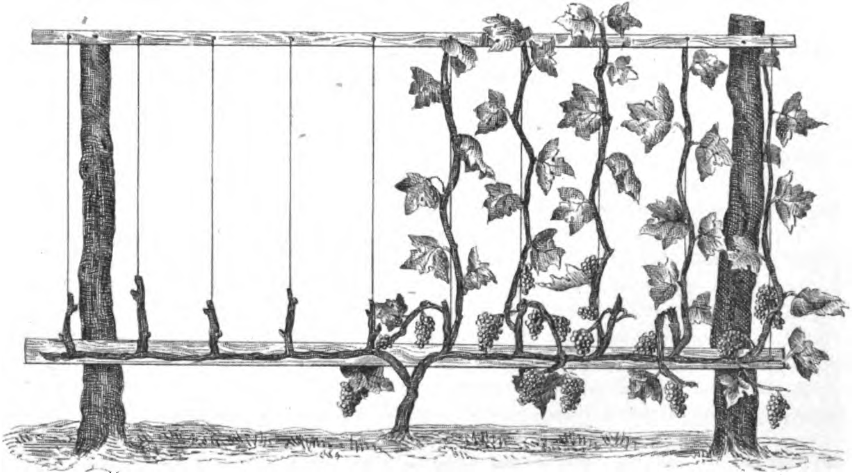
For the fourth season we cut back all the upright canes to two eyes. At this point the books teach us to cut to one eye, but let us compare. Any practical vintner knows that the lower eye on a vine is always least developed, consequently by cutting to two eyes we have some choice. The shoots growing from the lower eyes are trained to the wires and treated the same as those of the previous year were treated. Those from the upper eyes are also pinched to one joint above the latter cluster, as early as it can be done conveniently. These are trained to incline downward, by twisting the young cane and bending it downward, which, with the gradual increase of the clusters thereon, will prevent their upright tendency; these are also kept closely pinched in and laterals kept down, and, after fruiting, are cut



VINE PLANTED.—— SECOND SPRING.—— CUT BACK GROWTH OF 2ND SEASON.



THIRD SPRING.—— GROWTH OF THIRD SEASON.



FOURTH SPRING—— GROWTH OF FOURTH SEASON

H.M.ENGLE'S SYSTEM OF TRAINING THE VINE.

away altogether. By this method we retain the best eyes for fruiting, and, at the same time, secure well developed canes from the lower eyes by their being trained upright. These are left to bear some fruit, but as the bunches are usually inferior to those from second eyes, the thinning out is done on these. By this course of training the fruiting wood can be kept low, the same as by cutting to single eyes.

It is well known that the tendency of growth of vines is upward, and if not controlled by pruning and pinching, where they have a place to run up, the finest fruit will be near the top. This has led, or rather misled, many to trim their vines high, but we must not forget that by this method they will be further from the base of the vine each year, and eventually be out of reach. The only method by which vines can be kept to grow their crops uniform, is to have their bearing eyes on a level, as by the horizontal arm system, whether the arms are one or twenty feet from the ground. By the following method the old arms can be replaced by new ones without losing a crop.

Select, early in the season, two strong shoots near the center of the vine, and train them on stakes as directed for second year, and keep all the rest of the vine pinched back during the summer, and, unless the vine is vigorous, allow it to bear only a moderate or short crop, which will cause the two canes at the center to make the stronger growth, so that after fruiting the old arms can be cut away and the new canes tied to their place, and managed as directed for third season. Thus the vines can be renewed whenever necessary, and, with proper care, may continue in bearing indefinitely.

I do not claim anything original in the above method of trelising, which has been so fully described by A. S. Fuller and others, but what I do claim that is not found in the books, is the cutting to two eyes for fruiting, or if the second is not well developed, leave the third and cut out the second, instead of to one. This method invariably secures better bearing wood, and consequently finer fruit. There are other methods by which grapes may be successfully grown, as on trellises of three or four horizontal wires; upon these vines are commonly trained on the long cane system, by which the best bearing eyes are always secured, but, as above referred to, the canes on the upper wire produce the best fruit at the expense of those on the lower wire. The renewal is also more difficult than upon the horizontal arm system. In extensive vineyard culture stakes are generally resorted to, being least expensive. Various methods of training to stakes are also described, but this paper will not admit of details.

One other method, however, is extensively practiced, and backed up strongly by the arguments, that nature does no pruning, and therefore it is best not to prune at all, or very little at most. This sounds very plausible, but neither does nature plant her vines by cuttings, and as we depart from nature at the outset, there is no sound reason to go back and ask her to finish the job which we have begun in opposition to her system.

We will admit that very fine grapes are oftimes found on vines growing upon trees, etc., left to their own way. I have seen such and thought at one time it was the true method for growing grapes; but a few years of observation dissipated all my faith in that direction. I have settled down to the belief in close pruning and systematic training for all vines, (except the most rampant growers,) as the most reliable. As Mr. Fuller has well said, the finest grapes, after all, are produced upon closely pruned and properly trained vines.

Mr. MERCERON remarked years ago, that our native grapes do better in grass than by culture. Has two rows of Franklin in sod, which bore fruit every year; soil, sandy loam; and liable to wash when not in grass. Average twenty-five pounds to the vine last year. Vines eleven feet apart, trellis six feet high, and grow grapes from top to bottom. Have not cost one dollar for manure or labor in twelve years, except trimming and tying up.

Mr. ENGLE. Mr. Merceron must have a peculiar soil to succeed so well without manure. Think his vines must eventually fail without some manure.

Mr. MERCERON. So long as vines grow sixteen feet in a season, need no manure.

Mr. JAMESON. Have four or five hundred vines, chiefly Clinton and Concord, planted twelve years ago. They bore good annual crop, until last summer they were injured by a cold spell while in bloom. Half the Clinton froze and dropped, but almost entirely recovered in a few weeks. They were summer pruned, and a dry hot season followed, which entirely destroyed the fruit of Clinton, and about half the Concord. Thought they were injured by too severe pruning and exposing the vines to the heat and sun.

Mr. LAUER. That is the German method, and will do in Germany, but not here.

Mr. MILLER has a vineyard on a hillside, which he put to grass to keep from washing. Trellis seven feet high, vines trained horizontally. Grows fruit on laterals, from upright canes, which answer for main stems. Explained the renewal system, as practiced at Louisville.

Mr. SATTERTHWAIT called the attention of the Society to a new enemy of the peach tree, and asked for information.

Mr. WANNER first noticed it about three years ago. At first, but few were seen, but last season he had a tree killed and others injured.

The SECRETARY referred the Society to their reports for 1877, in which the insect is discussed by Prof. Rathvon, of Lancaster. It can be killed by applications of whole oil, soap, or tobacco juice.

The subject of "Pears," was again resumed.

Mr. HILLER had not found more than five varieties worthy of cultivation. They were Manning's Elizabeth, Bartlett, D'Anjou, Seckel, and Lawrence. Clapp's Favorite is a fine, showy fruit, but subject to core-rot. Has had Tyson fifteen years, and has never seen a specimen of its fruit.

Mr. H. M. ENGLE spoke very highly of Howell. It is a good grower, a fine, showy fruit. Tree somewhat subject to blight.

Mr. SATTERTHWAIT had omitted one variety, in his list of pears, that he wished to speak of. It is a seedling, and said to be a cross between the Old Chinese Sand pear and Dutchess d'Angouleme. It is remarkable for its strong, healthy foliage, and vigor of growth. It is named "Kieffer's Seedling," and originated with a Mr. Kieffer, of Roxborough, Pennsylvania.

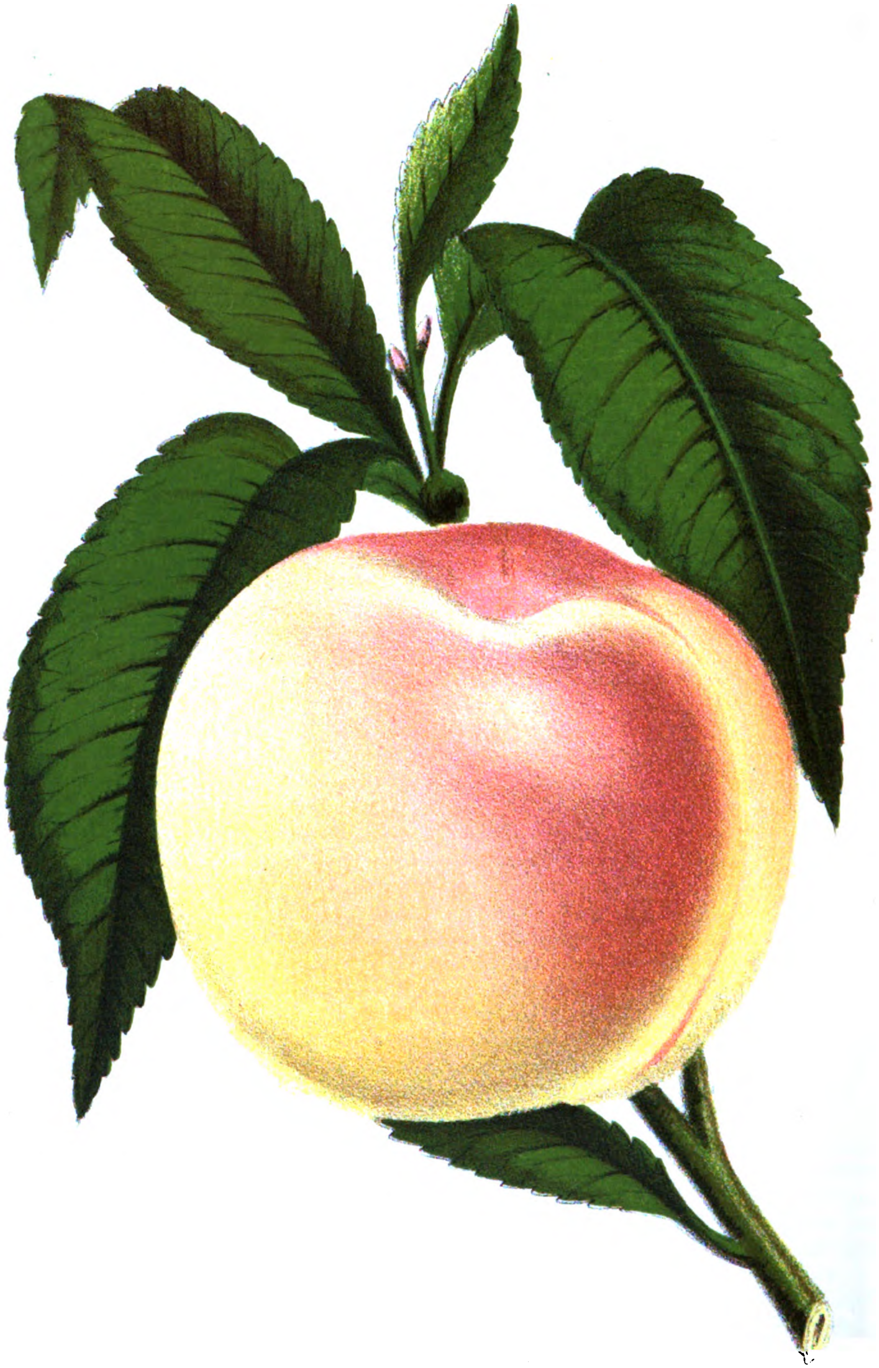
Mr. MEEHAN has known this variety for several years, and can confirm what has been said in regard to its vigorous growth and healthy foliage. It is cross between Chinese Sand pear and Flemish Beauty, and has an odor similar to the quince. It was exhibited at the Centennial, and the committee awarded it honorable mention.

Mr. MILLER had first brought this pear to notice. The fruit is melting and juicy, and has remarkable keeping qualities. Thinks it will be further improved, and may be forerunner of a hardy race of pears. The tree is a fine, upright grower, not subject to blight nor injury by insects.

Mr. MEEHAN has a tree, received from the originator some three years ago. It had this year over fifty pears, and will, no doubt, be an enormous bearer.

Mr. SATTERTHWAIT uses the Sand pear for stock, as it is not subject to leaf blight. In a paper, read before this Society some ten or twelve years ago, he recommended its use for that purpose.

Adjourned.



BRADLEY

Originated in East Donegal Township, Lan. Co., Pa.

Fruit large, freestone; flesh white, firm, juicy, rich and good; leaves with globose glands; tree a vigorous grower and abundant bearer; ripens after Late Crawford and is one of the finest white fleshed peaches of its season; not generally disseminated.

EVENING SESSION.

The subject of "Peaches, Varieties, Culture, and Diseases" was taken up.

Judge **Stitzel** read the list of varieties recommended for cultivation in Berks county.

Mr. **Satterthwait** was surprised to hear that Hale's Early was still recommended. With him it is not worth cultivating.

Mr. **Thomas.** ' It is still one of the leading sorts in some parts of the West and Michigan. Not worth planting at West Chester.

Mr. H. M. **Engle.** Has now growing on his grounds some eighteen or twenty new early varieties, all claiming to be two weeks earlier than Hale's. So far as his observations have gone, there is but little difference in earliness. Some adhere somewhat to the stone, but are not strictly "clings." Has fruited Musser, Cumberland, Wilder, Saunders, and Downing. Considers Musser one of the earliest and best of the new sorts. What we want is a new early sort, not liable to rot, and entirely free from the stone. Since he first commenced growing peaches for market, the peach season has been wonderfully prolonged. First came Hale's Early, which was two weeks ahead of our earliest sorts, and now Amsden and Alexander are fully two weeks in advance of Hale's. Then we had Smock's Late, some two weeks later than our former latest market variety; then Salway, still four or five days later. Has had no more profitable variety under cultivation than Smock's Late. It carries well, attains good size when not allowed to overbear. "Reeves' Favorite" is one of the finest varieties we have. It is a large yellow peach, ripening about with O'Mixon. Has had considerable trouble with yellows, and fears it may become a serious drawback to peach culture.

Mr. **Satterthwait.** Had rather limited experience in peach culture. Had about 1,100 trees in bearing. For early, recommended "Mountain Rose;" for late, Salway.

Mr. **Thomas.** Early varieties not profitable in Chester county. Would plant no earlier variety for market than Late Crawford.

Mr. **Bartram.** Indorsed Mr. Thomas' views. Of six hundred and ten trees, planted five hundred and fifty Late Crawford.

Mr. **Brinton.** Thought Red-Cheek Melacoton a valuable variety.

Judge **Stitzel.** Thought there was no danger of the peach market being overstocked yet. Home-grown fruit is always in demand here, and generally brings about double the price of that brought from Delaware and Maryland.

Mr. **Engle.** With new and improved facilities for drying, there need be no fears of an overstock.

Col. **Stichter** requested Mr. Meehan to give his views upon the "Yellows."

Mr. **Meehan.** Could not say more than he has said at former meetings. Experiments have proven that minute microscopic fungii attack the roots, and send their spores through the tree. Experiments have proven that by inoculating this fungus matter from peach roots to those of Norway spruce, similar results can be produced. These spores can be seen, upon examination, by digging the earth from the roots and examining with a microscope. They attack the ends of the young fibers, and destroy the tree by depriving it of its nutrition.

Mr. **Satterthwait** inquired whether this fungus is confined only to the roots of the trees.

Mr. **Meehan** stated not. It first attacks the roots, then spreads from one tree to the other.

The following paper was next read:

ORIGIN OF THE DELAWARE GRAPE.

By SAMUEL STEVENSON.

In the case of this, the most valuable of all the finer sorts of American grown grapes, more of mystery seems to attach to the opening of its culture than pertains to any other equally valuable fruit.

The best authors place it first in the ground of a Mr. P. H. Provost, at Frenchtown, Kingwood township, Hunterdon county, New Jersey, whence some German laborers carried it to the vicinity of Delaware, Ohio, where it fell under the observation of Dr. Campbell, who brought it before the public with the name of the place of his abode. This name has been its common one ever since, except occasionally that of Italian Wine, or Wine Grape, by which it is still called in northern New Jersey.

With a hope of benefiting the public, by helping forward the pursuit of the proper name of this grape, I have prepared the following synopsis of my own personal observations upon the subject, intending to have presented them at your last annual meeting, which circumstances prevented my attending.

In the after part of the year 1832, my father purchased a valuable farm in the above mentioned neighborhood at Quakertown, Kingwood township, and but a few miles from the home of Mr. Provost, who is referred to above.

Upon removing upon the same in the spring of 1833, the writer, then a small boy, remembers very well a fine large vine of this grape at the west end of the farm-house, and in the following autumn, its fruit, with the greatest abundance of other choice fruits, as Green and Yellow Gage plums, Seckel and Virgalius pears, Queen, Smith's Cider, and Yellow Bellflower and Newtown Pippin apples, gave evidence of the thrift and good taste of the amateur farmer and fruit gardener who preceded my father in the occupancy of this farm. This gentleman, Mr. James Waterhouse, was an amateur, and a man of means, culture, and leisure, and a particular friend of one who, while his home was in Kingwood township, was much of his time abroad, and who filled, for several years, the position of American Minister at Tunis—the Hon. Charles Coxe.

From Mr. Coxe, while abroad, Mr. Waterhouse seems to have been in the habit of receiving, at various times, beautiful, rare, and valuable foreign presents, amongst which I very well remember, as being left upon the farm when my father became its occupant, a fine male specimen of the Broad Tailed or Five Quartered African sheep, the same upon which Messrs. Stanley and Livingstone feasted themselves upon at their memorable first meeting at Ujiji, in the heart of the dark continent. My older brothers were fond of plaguing this animal in his well secured enclosure, to witness his ferocious bunting of the fence panels.

Mr. Coxe sent, also, a pair of Abrabian horses, some foreign cattle, vases, statuary, and many other objects of interest and value from abroad, which he seems to have distributed liberally among his many friends in New Jersey. That the grape, in question, was among his presents, and that this large vine at my father's door was the first importation. That it was the *companion de voyage* of the five quartered African ram, the Abrabian horses, and other productions of the Barbary states, I have fully believed from my boyhood.

I have presented specimens of the fruit and vine to Germans, Frenchmen, and Portuguese, some of them grape growers, for recognition, but met with invariable failure for many years. Finally, while our Centennial Exhibition was open, I was at much pains to find further proof of my view of the subject, and presented specimens of the fruit and vine to the Spanish commissioner, M. Givatta, who failed to recognize it as a Spanish grape, as did also Sen. Jose Jordana and S. Vidal, of the Spanish commissioners, although the latter spoke of its resemblence to one or more of their native varieties; but the representative from Morrocco, at the Morrocco bazar, claimed to be perfectly acquainted with it, and gave me its name in Arabic, "Simslashee," and pronounced it as watery and worthless, from its want of pulp, for rasin making, which makes the value of their best grapes. Finally, M. Valenci, of Tunis, recognized it plainly, and called it by the terms "Aret," or "Anet," and "Ancotios."

With these remarks, I submit, humbly, my opinion, that the pride and beauty of our vineyards is the first representative, by way of fruits, of the Barbary States. That it came to us through the fostering care of Mr. Coxe, American minister at Tunis, under Jackson's administration, and that the gold of the gold coast; the ostrich plumes of the capes; or the ivory of the interior, about the Albert Nianzi, were one or all poor boons besides the amber berries of the prince of grapes.

Mr. **SATTERTHWAIT** saw Mr. Rickett's collection of seedling grapes at Centennial, and considered them the most remarkable collection there exhibited. All were very good, and some equal to any foreign variety. They were also exhibited at the last exhibition of the Pennsylvania Horticultural Society, and attracted general attention.

Mr. **MERCERON** saw them three years ago, and tested all of them. Thinks well of some of Mr. Rogers' Hybrids. Has been eating some of No. 1 until a few days ago. Has kept them successfully by packing in their own leaves. Considers them as good as Black Hamburgs. Has grown No. 4, but is a poor bearer. No. 19 resembles No. 4.

Mr. **THOMAS** does not think that Mr. Ricketts' seedlings have been generally tested anywhere except by the originator. He has a very favorable location, and appropriate soil, on the Hudson river. Is doubtful whether they will succeed as well elsewhere as at home.

Mr. Fox, (Reading, Pa.,) called the attention of the Society to a new white grape on the grounds of Mr. W. Y. Lyon, of Reading. It has a beautiful transparent skin, bunches compact and well shouldered, and the vine is as hardy as the Clinton. It has been named the "Lyon Grape."

On the subject of "Cold Graperies," Mr. **SATTERTHWAIT** thought they could no longer be made profitable, because of the competition from California.

Mr. **MEEHAN** thought they could still be profitably grown, if the proper market could be found. They can be matured before the California fruit reaches us. Will pay a good profit at fifty cents per pound.

Mr. **DARLINGTON**, (Chester county,) has sold them at thirty-five to forty cents per pound. Thinks they could be grown at twenty-five cents per pound.

The "Strawberry" question was briefly discussed. Inquiry was made concerning the "Sharpless."

Mr. **MERCERON**. This variety first bore in 1872, and is a seedling from a bed where Jucunda, Seth Boyden, and Green Prolific were growing promiscously, or in close proximity. Saw and tested the fruit every season since. It seemed to retain its good qualities and increase in size with more careful cultivation. It is a vigorous grower, and keeps its foliage green until the close of the season. It is a large cropper, the last berries continuing in good size and shape. It ripens a few days after Wilson. It seems to thrive equally well in all kinds of soil. Should be grown on the "Hill" or "Stool" system, and planted twenty inches apart on rows. Has fruited Durand's "Great American," but it is a failure with him. Saw all Mr. Durand's seedlings in New York, and also on Mr. D.'s grounds, where they succeed remarkably well. His "New Jersey Queen" is the finest strawberry ever saw. Saw also "Crescent Seedling," in New Jersey. It is a fruit of poor quality, but a good bearer and rampant grower.

Mr. **MEEHAN** received fine specimens of "Sharpless" three years ago from the originator. They were fully as large as the colored plate in last report represents them, very well colored, and of good quality. Saw them last season in June, at Rochester, on the grounds of Messrs. Elwanger and Barry. It was considered the largest and best berry in cultivation there.

Mr. **BARTRAM** inquired about "Monarch of the West."

Mr. **SATTERTHWAIT**. Not reliable. Large size, but poor in quality. Still plants more Jucunda than anything else. Thinks well of Cumberland Seedling. It is twice as large as Green Prolific.

Mr. **BARTRAM**. Cumberland Seedling is, with him, the best among eight or nine varieties planted lately.

Mr. **MEEHAN** stated that he often did things from a sense of duty and pleasure, but in offering the following he felt that in addition he was doing himself an honor.

He read the following resolution:

Resolved, That the Fruit Growers' Society of Pennsylvania tenders its hearty thanks to the Berks County Agricultural Society, on whose invitation the meeting was held in Reading, for their cordial reception and generous hospitality during the session.

And to the citizens of Reading in general, and to Colonel J. L. Stichter in particular, for the handsome manner in which the members have been in every respect treated, and which generous kindness they will never forget. We particularly desire to express our thanks for the very successful efforts of Colonel Stichter to increase our membership, which have resulted in a greater accession to our list than we have for a long time experienced.

And we further desire to offer our best thanks to the public press of Reading for the full and admirable manner in which they have reported our proceedings.

To W. S. Ritter, Esquire, we also desire to express our deep obligations for the free use of the hall in which our meetings have been held, and for other courtesies.

Judge **STITZEL** added the name of the janitor, Mr. Moyer, and as amended, the resolutions were unanimously adopted.

Honorary Members.

On motion of Mr. **THOMAS**, Messrs. Patrick Barry and George Elwanger, of Rochester, New York, were elected to honorary membership.

On motion, Messrs. George D. Stitzel and Alex. Burnet were appointed a committee to make a selection from the fruits on exhibition, and send the same to Mr. Downing.

Adjourned.

LETTERS AND ADDITIONAL SUB-REPORTS TO CHAIRMAN GENERAL FRUIT COMMITTEE.

[The following are the additional sub-reports referred to on page 11, and which it was feared could not be published for want of room. Some of them originally were not intended for publication, but as all are interesting and contain much useful information in a condensed form, the Publication Committee takes pleasure in having them printed entire.]

A Home Supply of Fruit.

It might seem presumptuous to intimate to the farmers of Pennsylvania that they are not well acquainted with the culture of fruit; and, in fact, the great success that, in many instances, have been achieved goes to justify the assumption that they are already quite skilled in the business. If some fail, it is probably through neglect; or, if in cases of ignorance on the part, it may be of beginners, they but need to look around them for an example of care and consequent success.

In following out what may be the leading strings of the farmers' business, the large interests, those on which he depends to make all ends meet, of course, demand his first attention. It is no uncommon thing to become so immersed in this necessary toil and care as to neglect many lesser matters upon which much of the enjoyment of the family depends. Among those lesser matters, it is the purpose of the present essay to treat only of producing a supply of fruits throughout the season.

In many cases, where a market can be reached, fruit culture can be expanded to become a great source of profit; but what should be especially encouraged is, that all families, in temporary or permanent occupation of land, however small the amount, should improve their opportunities to supply their families with fruit.

It would require this essay to be extended to a treatise, to speak particularly on the right culture of all these. As before hinted, if any be really wanting in knowledge, they will need only to look round a little for practical instruction.

A small patch devoted to strawberries will supply an ordinary family. The same may be said of raspberries and of blackberries, both of which should have a place, unless the neighborhood yields plenty in their wild state. There is hardly a home in our country but there are situations where a few Concord or Catawba grape vines may be trained on the face of the buildings. (The Catawba needs the protection of a southern or eastern exposure, and both need a favorable bed in which to strike their roots. They will thrive especially at the shallow foundation of a stable-wall, or in many other places, which common sense will indicate.) These, if kept vigorous, have uniformly, in my experience, produced abundantly.

There may, or there may not, be space for cherry trees. Cherries and plums are rather uncertain crops, and, happily for us, we may have a complete succession of fruits without them. Peaches, in all localities so favorable as this, should be attempted by every landholder. Let the Smock, Early York, or some of a few other sorts, known as abundant bearers of sound fruit, be selected; and, if a man's perches are limited, let the scores of new varieties, or even the old ones of doubtful reputation, pass unnoticed.

I regret that I cannot give a panacea that will keep peach trees alive indefinitely, but I have found that a situation that had not before been occupied with peach trees, the *dis*couragement at first of a rapid growth, subsequent manuring, with continuous culture, and the application, in liberal quantities, of wood ashes, have kept trees in vigor and full bearing fifteen to twenty years. After that age it is better to depend on younger trees for a supply of good peaches. In laying out for a good supply of fruits in succession through the year, the pear should by no means be overlooked. They may be on hand to gratify the children, and relieve the parents, in years when peaches are an exceptional failure, and no premises in the country should be so small as not to afford room for a few trees of this fruit. Dwarf trees of the Louis Bonne or some other available variety, will quickly bear a fair amount, but for a permanent supply, a few standard pears should find place around every dwelling. Let there be at least one of some reliable early sort, (none the worse for being an old-fashioned sort,) to be followed by the Seckel, Bartlett, and Lawrence. If your grounds and means are not ample, it were of better to give little heed to the fame the hundreds of varieties of French celebrities.

These fruits, thus enumerated as they occur through the season, should all receive due attention in a well regulated family, but the fruit for this region in general value exceeding all others is, of course, the apple—and here let me remark it is a circumstance that may well excite the attention of the orchardists of southeastern Pennsylvania that, at this time, all our villages and many farmers' families are supplied with apples from abroad. It is doubtless a good thing for our New York neighbors to find thus an extended market for their crop, but it were allowable in us to indulge so much selfishness as to aim in future at a home supply, though their market be curtailed.

The difficulty the present year has not been so much that apples did not grow, as that they did not mature upon the trees. It were impossible in our climate to induce certain famous sorts, such as the Baldwin and Northern Spy, to remain upon the trees until the weather is cool enough to keep them if picked. But these and many other sorts fully ripening in our climate attain a greater degree of excellence than where the approach of winter shortens their development.

For winter keeping, we should have some varieties requiring a longer season; and then, one grand point by which all, early and late, will be alike benefited is repeated culture of the ground. Trees and orchards treated this way have the present season yielded heavy crops, generally perfect, and presentable in market, while others, left in sod, have produced what has dropped and rotted, never becoming fit to gather.

The writer, on former occasions, has proved to his satisfaction that occasional culture of orchard land has been always beneficial. But the past summer he has met with a striking proof of the advantages of repeated summer culture. An orchard, in corn the year before, was plowed early in the fifth month for Hungarian grass. It was occasionally harrowed, and in the beginning of the sixth month seeded, as designed. Soon after the crop of hay had been gathered it was again plowed for wheat. After the customary process of culture, it was sown with this crop about the 20th of the ninth month.

I do not know of any other orchard in the neighborhood that received corresponding treatment, and can hear of no other but from which the crop fell prematurely and rotted. Even another orchard, on the same farm, whose fruit started equally well, and from which the very early apples were perfect and marketable, failed to mature the later sorts.

In the orchard thus cultivated at intervals during the summer, the fruit perfected well. It remained on the trees till quite ripe, and, notwithstanding the long delay of cool weather, such of the crop as was not marketed, or consumed, kept generally sound till the frost came on.

How often have I wished, when granting permission to children from the neighborhood to fill their baskets with our surplus fruit, that a supply for them was growing about their own homes. It would satisfy their natural craving; it would promote their enjoyment; it would make home more happy. The whole family could enjoy dainties with no cost but the care of culture, and it would promote in the expanding minds of the children a feeling of self-dependence that would give a powerful impulse in carrying out the responsibilities of life.

L. BALDERSTON.

COLORA, CECIL COUNTY, MD.

NEWTOWN SQUARE, DELAWARE COUNTY, PA.,
January 2, 1879.

JOHN I. CARTER:

DEAR SIR: I have not much to offer, but what I do know of the past year's fruit crop I will gladly give.

The varieties of apples which have borne with us were Knowles' Early, Princes Early Harvest, Maiden's Blush, White Doctor, Roxbury Russett, and Baldwin. The White Doctor is the truest bearer on my place. They have not missed bearing for fifteen years, and, a few years ago, was my most profitable apple for market purposes. Now they, with most of the apples of their season, are hardly worth taking to market.

There is a demand for good eating apples in the Philadelphia market about the time peaches are gone, and we hardly know what to plant for that demand. Strodes' Birmingham, Gravenstein, and Smoke-house have been talked of, but I think Strodes' Birmingham comes a little too early. The Gravenstein has the reputation of being a shy bearer, and, for me, the Smoke-house has always rotted badly. My neighbor, who grows Gravenstein, says it is the most profitable apple he markets. I have ceased looking to my apple orchard as a source of any profit. I can only use my summer and autumn apples by allowing the hogs to eat them, as they fall. I find winter apples, with us, sell well.

In the way of pears, I had a pretty fair crop of Bartletts, Howells, and Beurré d'Anjous. The last named are not first-class with me; but, coming after other varieties are over, I find them marketable. The Bartlett and Seckel are the two great selling pears, as far as my experience goes, and next to them the Buffum, not for its quality, but on account of its lateness. The Buffums produced but few pears this year. If I were planting pears again for market, I should plant only Bartlett, Seckel, Buffum, Howell, and Buerré d'Anjou. My experience, so far, has not warranted the Lawrence as a profitable variety. Out of one hundred and seventy-five trees, I have had four cases of blight, and about the same the year previous. It has not yet touched my Bartletts or the Buerré d'Anjou. I have not known it to affect Brandywine, Buerré Hardy, or Kingsessing. These three last named may prove reliable varieties as they get more age; but, coming so near to the Bartlett season, and being inferior in quality and in appearance, I think they will not prove profitable. I, like most all others, have planted too many varieties, and, consequently, have many worthless trees. Fortunately, the blight seems to prefer some of these varieties. I do know that I can look upon the blight as so great an enemy to fruit culture, as some do. While it plays great havoc among our trees, it keeps up the prices of the fruit, and I have no doubt that, were it not for that, fine pears would become as great a glut in the market as summer and autumn apples now are. I have been planting fruit trees from ten to fifteen years, and never had any return worth mentioning from my pears till the three last years. I find the most profitable way of handling Bartlett pears is to let them remain on the trees as late as possible. Of course, you lose a good many by so doing, but the balance is worth more than the whole crop, if hurried into the market. I gather the pears which fall every morning, and market all that are marketable of them, and, when I find they fall badly, I take them off. In order that they may not bruise, I mulch the trees with the grass that grows upon the orchard. If it can be done, I find pears should be taken to market before they are ripe enough for the table, and be allowed to lay a few days before exposed for sale. The handsomest fruit I ever offered for sale were some to green for use, which I packed away in market from one market day till the next, which was from three to four days. A Bartlett pear, when fit for the table, is so delicate that it cannot be carried without injury.

I grow no native grapes for the market but the Concord. I have had abundant crops for a number of years, till this past year, when it amounted to a complete failure. The prices for Concords have considerably declined, and I find from four to five pounds for twenty-five cents is about all they will command retail. I have had good results in foreign varieties in a small cold grapery for five years past. This year I have had more mildew, and the grapes have not colored as well as in other years. The California grapes, early, and the Almeria, later, have very much injured the sale of them; and from sixty to sixty-five cents per pound wholesale in other years I have been forced to sell at retail in the market this year for from thirty-five to forty cents a pound.

If this report is of any value, I am very happy to have given it.

Most respectfully yours,

JOSEPH LEWIS, junior.

SHIREMANSTOWN, PA., *January 6, 1879.*

JOHN I. CARTER:

The fruit crop in this section was in a great part a failure the past season. The peaches froze in the bud last winter, so we had few in the valley, though on the surrounding hills they had a fair crop. Apples and pears did not come to perfection, or at least few of them. Of apples the York Imperial was by great odds the best; was perfect, and a good crop. Cannot say this of any other variety, though the Hubbardston's Nonsuch, Ben Davis, Smith's Cider, and Baldwin were fair. Few apples keep well this winter. The Bartlett and B. de Anjou were about the best among the pears. Had a good crop of these through this valley. Cherries, strawberries, raspberries, and other small fruits were only a partial crop. I think this was owing to the very cold spell in April. All fruits were injured more or less. The plum crop was good. It appears to me that the curculio are not as distructive as they were some years ago.

The prices of fruits were, and are still, low. All kinds of fruits were very cheap this season.

Yours, respectfully,

HENRY S. RUPP.

JENKINTOWN, *January 10, 1879.*

TO JOHN I. CARTER:

RESPECTED FRIEND: In answer to thy request, I may state the season of 1878 opened with an abundant bloom on most of my apple orchards and other fruits, and a fair crop of fruit set; but, from various causes, not much was gathered in. The summer and fall varieties did better than the winter ones. The warm, late fall ripened up and caused many varieties to decay and drop off; and another cause was the insects. I think, after several years continual fruiting, the insects that are injurious to fruit, if not carefully destroyed, will so increase as to take a large part of fruit, or render it so imperfect as to be of little use; whereas, if we have a year or two of scarcity of fruit, they will decrease for want of a proper place to propagate.

In consequence of the poor fruit yield, barreled apples from New York and the East are sent on and sold at the railroad stations and other places.

It seems that the season has much to do with the success or failure of certain varieties of apples. The warm, dry weather of last fall caused many varieties, which usually do well with us, to ripen, decay, and drop off, though the Hagloe, Gravenstein, and Porter did better than some others. Among the winter varieties, the Ridge Pippin was the best. I wish to call attention to this old and reliable variety, being always considered a very productive apple. This year I had more apples to take in from five trees of this variety than all others in my orchard, but they were riper than they generally are other seasons, as they usually keep until spring.

Respectfully,

SAMUEL W. NOBLE.

LEWISTOWN, PA., *January 9, 1879.*

MR. JOHN I. CARTER:

DEAR SIR: Your note of December 29, came duly to hand, and in reply will say that the cold spell we had last spring entirely destroyed the grape crop, and very much injured the vines, and also rendered the peach crop a very light one. I sold, from my little orchard, forty bushels at two dollars per bushel, and my neighbors, who have from one to two hundred trees, failed to get any fruit, and are as favorably located as I am. I attribute the above to liberal manuring with ashes from the tannery, which supplies a part of the necessary food to the tree to form well developed fruit buds, and renders them the more able to resist the cold. This is the second time in five years that I have had peaches while my neighbors had none. The apple crop was not a profitable one on account of the very warm and extremely dry summer, which prematurely ripened the fruit, and the high wind, during the equinoctial storm, caused so much of it to fall, and the remainder of them did not keep well. They were sold at from forty to sixty cents per bushel. Plums were produced very abundantly, and were sold at from two dollars and fifty cents to three dollars and fifty cents per bushel, according to size and quality. The young wood also made an unusual growth. Quinces did reasonably well, and were sold at the rate of twenty-five cents per dozen. Mr. Martz and Mr. Evans, of our town, had the finest quinces I ever saw; the former had one that weighed twenty-two ounces. They were all large, and perfect as wax work.

Hope you will have a pleasant and profitable meeting at Reading. I will not be able to attend it.

Yours, respectfully,

WM. M. PANNEBAKER.

PICTURE ROCKS, LYCOMING COUNTY, PA.,
January 2, 1879.

MR. JOHN I. CARTER, *West Grove:*

DEAR SIR: Your favor of the 19th is received—asking for reports, &c. The section of which I speak embraces Lycoming and other counties adjoining. The general fruit crop, tree, cane, and vine, were, to a great degree, injured by the late frosts, which came in latter part of May. Only those in favored localities partially escaped. Late varieties fared the best. The red sour cherries are badly afflicted with the black knot, so much that few are grown. The leaf blight has nearly finished the quince, and is doing its work on the pears, and if a change for the better does not come soon, we shall have none. Apples seem generally healthy. The fruit that did escape was fair; but, as is the case always, it ripens too early to keep well. Blackberries, being later, escaped generally, which was the only exception. In the northern tier of counties the fruit was more backward, consequently was less injured.

Yours, truly,

A. R. SPROUT.

PLANS FOR COUNTRY RESIDENCE.

By C. H. MILLER, *Landscape Gardener*, *Mt. Airy Nurseries*, *Philadelphia.*

[By some mistake or oversight these plans by Charles H. Miller, Esquire, of Philadelphia, were published in our last annual report, without any key or explanation. Being unintelligible in that shape, Mr. Miller has kindly furnished the accompanying explanations and references, and the whole are republished in this report.

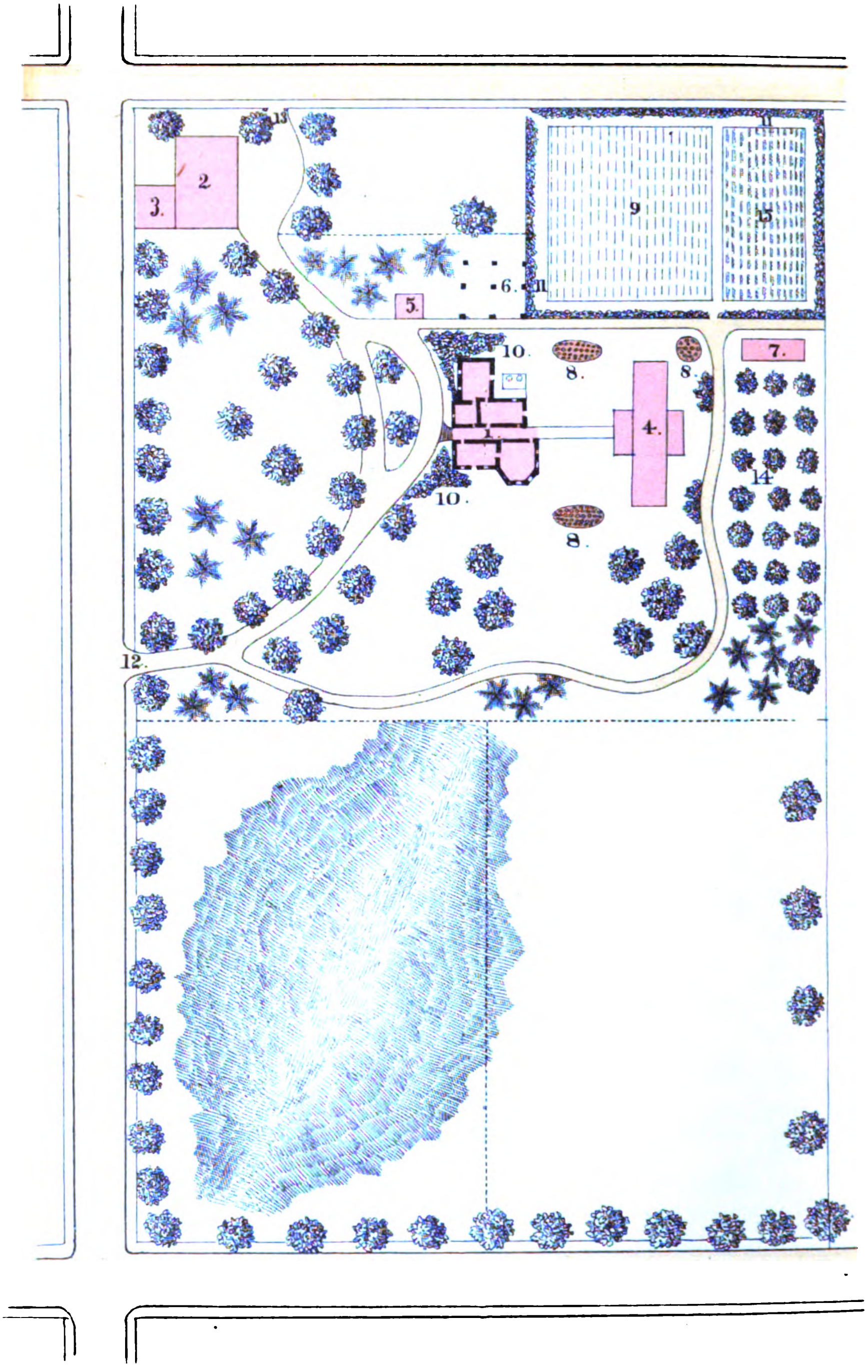
It is due Mr. Miller to say that his original plans, a year ago, were furnished with the proper references and explanations, but they were lost or mislaid after leaving his hands.

E. B. ENGLE, *Secretary.*]

The accompanying plans represent a property before and after improvement. No. 1 representing the original, and No. 2 the improved grounds. All the necessary alterations were accomplished at a moderate cost. The disposition and general arrangement of the buildings are the same. The field and paddock are added to the pleasure grounds, and the whole plot is re-graded and planted. The approaches are altered, and the main entrance is located on the principal street, which was not the case before the improvements were made. The drive, being elevated by an embankment through the ravine, affords the opportunity to bridge by means of arches, which are made a distinct feature, the walk running down the hollow, and under the drive. By this arrangement is secured the convenience of a private walk quite out of view from the adjacent streets, as well as from the main drive. The embankment being planted with choice evergreens and shrubs not only adds to the privacy of the walk passing underneath, but also forms an imposing amphitheater-like outline to the lawn.

A very pretty fountain is placed between the dwelling and the conservatory, and vases are located at conspicuous points. A summer-house is placed in such a position as to command a view of the entire lawn. The heavy belting of planting around the place effectually shuts out all that is objectionable from the inside. The glades are long and sunny, allowing ample space for the shadows to play on the smooth grassy surface of the lawn.

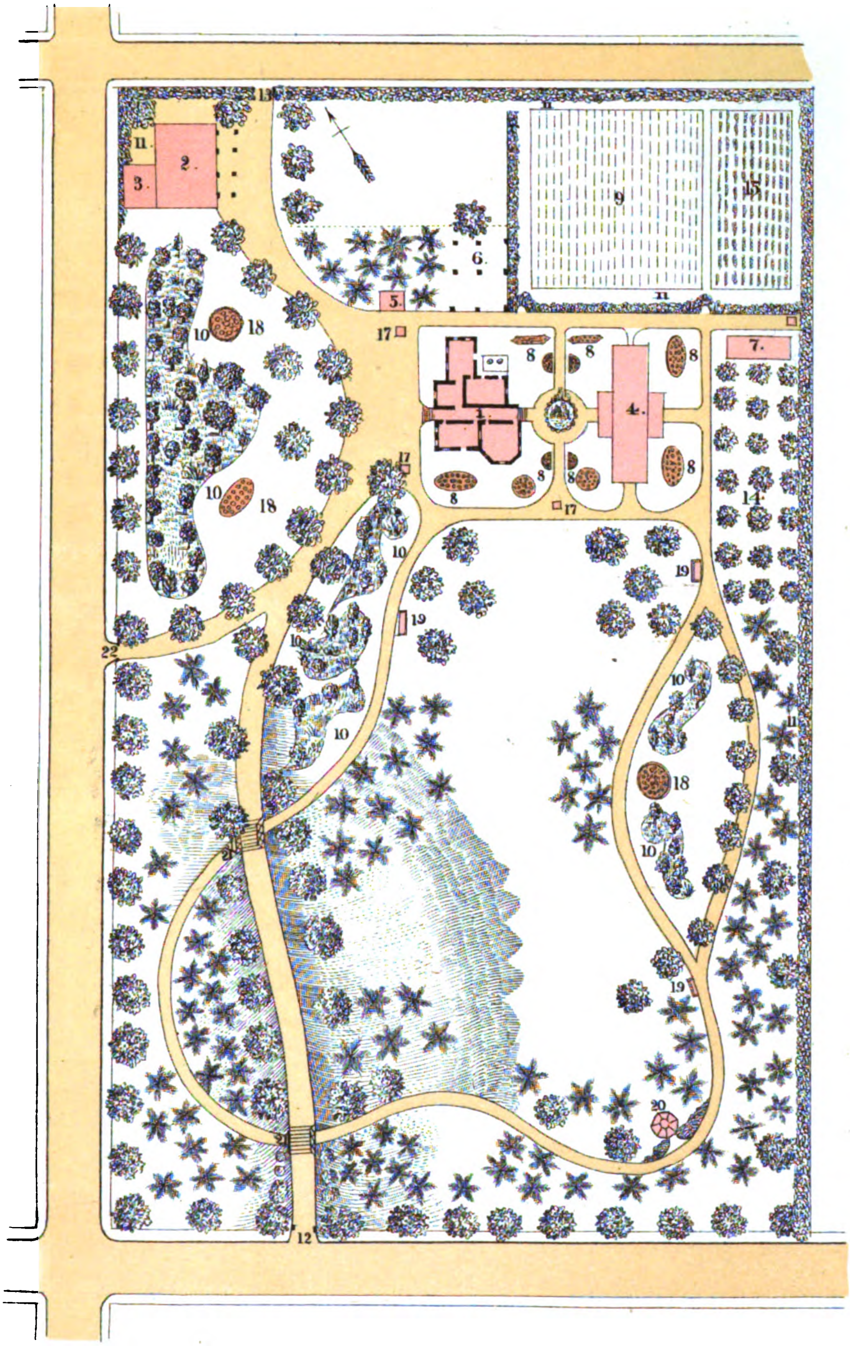
Nº 1.



REFERENCE TO PLAN Nº 1.

1. DWELLING. 2. STABLE. 3. SHED. 4. GREENHOUSE & GRAPERY. 5. ICE HOUSE. 6. LAUNDRY YARD.
7. HOT BEDS & FLOWER BEDS. 9 KITCHEN GARDEN. 10. SHRUBBERY. 11. HEMLOCK HEDGE.
12. MAIN ENTRANCE. 13. BACK ENTRANCE. 14. FRUIT ORCHARD. 15. SMALL FRUITS.
● DECIDUOUS TREES ✷ EVERGREEN TREES.

No. 2.



REFERENCE TO PLAN No. 2.

1. DWELLING 2. STABLE 3. COW HOUSE. 4. CONSERVATORY. 5 ICE HOUSE. 6. LAUNDRY YARD. 7. FORCING PITS 8. FLOWER BEDS. 9 KITCHEN GARDEN. 10. SHRUBBERY. 11. HEMLOCK SPRUCE HEDGE. 12. MAIN ENTRANCES. 13. ENTRANCE TO STABLE. 14. ORCHARD. 15. GARDEN FOR SMALL FRUITS. 16. FOUNTAIN. 17. VASES FOR FLOWERS. 18. ROSE BEDS. 19. RUSTIC SEATS. 20 RUSTIC SUMMER HOUSE. 21 BRIDGE OVER PATH.

BUTTERFLIES AND MOTHS OF NORTH AMERICA, IN THEIR RELATION TO HORTICULTURE AND FLORICULTURE.

HERMAN STRECKER, *Reading, Pa.*

That the study of entomology is an absolute necessity to the fruit-grower, the florist, the general gardener, is a fact beyond all cavil, inasmuch as every tree, bush, weed, or flower has its insect depredator, or rather depredators, for they seldom escape with the persecution of one pest alone; and no matter how unsavory, or even deleterious, as many of these may be as food for the higher animals, they are devoured with apparent relish by these rapacious pests, either in the perfect or winged state, or, which is by far more frequent, in the larva, or worm, or grub condition. Nor, as we are well aware, do these grubs, commonly known as caterpillars, worms, or maggots, confine their destructive powers to consuming the foliage of plants, but also attack stems, flowers, fruit, and even in numerous cases bore and burrow into and within the heart of the solid wood of large trees.

What I shall more particularly treat of will be the insects comprised in the great order technically designated the *Lepidoptera*, (from the Greek *lepis*, a scale, and *pteron*, a wing,) but commonly known as butterflies and moths, which comprises by far the greatest number of insects injurious to vegetation. Nor is there, as just alluded to, any plant exempt from their ravages. The bitter sage, the poisonous stramonium, euphorbiæ, and solanaceæ, the tough, unsavory firs, pine and spruce, thistles and nettles, and even the dry, parchment-like lichens, all furnish palatable food for various species. In fact, there is no plant growing, from the gigantic red-wood trees (*Wellingtonia*) of California, down to the lowly violet, that is exempt from their attacks. Of those feeding in the larval or worm state on the grape alone, are *Procris Americana*, which, when perfect, is a small, narrow-winged black moth, measuring less than an inch across the wings; the Pandorus (*Philampelus Pandorus*, Hüb.,) and Achemon Hawk moths, (*P. Achemon Dru.;*) two large humming-bird moths, expanding across the wing three and a half to four and a quarter inches in different individuals, are both beautiful insects; the first of various tints of dark and light olive green, the second of shades of salmon and rose. Both are produced from huge, naked worms of either green or brownish color, which are among the most voracious of their kind, consuming the leaves in a manner frightful to behold. Allied to these is also the Myron Hawk moth, (*Darapsa Myron*, Cram.,) which is, however less in size, being only about two and a half inches across the wings. The front wings and body are olive green, varying in shade in different examples. The hind wings are brick red. The worm which produces this, in addition to eating the leaves, has the abominable habit of eating through the stems of the young bunches of grapes, causing them to fall off.

Abbot's Hawk-moth, (*Thyreus Abbotii*, Swains.,) is about the same size as the preceding, but belongs to a different genus. It has an unusually robust body, terminated by a fan-shaped brush of feathery hairs. The small hind wings are conspicuous for their bright yellow color. The fore wings and body are dark grey and brown, variously shaded and striated. This species is far less common than the three above described. Its worm, like that of the Philampelus, is produced of two colors, either brown or green. All four of these Hawk-moths feed with equal relish also on the Virginia creeper, (*Ampelopsis Quinquefolia.*)

The little eight-spotted day-flying moth, (*Alypia Octomaculata*, Fabr.,) is about one and a quarter inches across the wings, of a shining black, with two large round pale yellow spots on each front wing, and two white ones on each hind wing. The worm of this is a little over an inch long, and banded with many black, white, and orange stripes or lines, and spotted with black. At a first glance it has a bluish look, which, on close inspection, proves to be an illusion. Its head is reddish, or rust-colored.

Another allied insect (*Psycomorpha Epimenis*, Dru.,) is of somewhat smaller size, black, with a pale yellow band across the front wings, and a bright red one across the hind wings. Its worm somewhat resembles that of the eight-spotted moth just alluded to. Another worm very closely resembles that of the eight-spotted moth, though belonging to the owlet moths, (*Noctuidae*,) and producing an entirely different looking fly. This is upwards of one and three quarter inches, has white upper wings with deep brown border, and yellowish hind wings. It is, in common parlance, called the beautiful wood nymph. Science knows it as *Eudryas Grata*, Fabr. There is a closely allied species, (*Eudryas Unio* Hüb.,) also said to feed on the vine; but this fact has never come under my observation, nor am I sure that it is at all well authenticated. My friend, Dr. Pilate, found myriads of the larva feeding on *Epilobium Coloratum*, some miles from Dayton, Ohio.

The common white moth known everywhere as the "Miller," consumes, in the larval state, the grape leaves with avidity. It is the common yellow hairy worm seen everywhere, which feeds on almost any green thing, indiscriminately.

The little leaf-rolling moth, (*Desmia Maculalis*, Westw.,) is from a small green worm, that makes for itself a habitation by rolling up a leaf. This little moth is shining black, with two white spots on each front wing, and an irregular double spot on the hind wings. The male has a curious sort of knot about the middle of each feeler or antenna.

The worm of the dainty little feather-wing, or plume moth *Pterophorus Periscelidactylus*, Fitch.,) devours the blossoms of the grape, as well as the young leaves, first making a shelter of them by drawing them together with some silken threads. It then takes its repast with more ease of mind than is possessed by the vine-grower on discovering its ravages.

The copper-underwing (*Amphipyra Pyramidoides*, Guen.,) is a moth belonging to the Owlets, (or *Noctuidae.*) It is upwards of two inches in expanse, of a dark brownish gray, with bright copper-colored under or hind wings. Its worm is greenish white, with a yellow stripe on each side, and a white one on the back. This worm is not confined to the grape, but will cheerfully take to various varieties of raspberry as well as other plants.

Another allied species, (*Amphipyra Tragopoginis*, L.,) found both here and in Europe, also takes kindly to the vine for food. These, my horticultural friends, are the more well known butterfly foes that you are compelled to do battle with in order to save your grapes, both vine and fruit, from destruction.

As I do not intend to more than barely allude to other orders of insects, I will but add that besides these Lepidopterous worms, the poor grape must suffer from the grubs of several beetles, which perforate the leaves, riddling them like a sieve; from a small Hemipterous insect called *Tettigonia Vitis*, or the vine Tettigonia, and the terrible *Phylloxera*, which belongs to the gall insects. So each plant has its enemies, and the more value the plant has the more enemies will appear to assail it. Those alluded to above feed on the leaves, and in one instance on the blossoms. Others, moth grubs, besides feeding on these, likewise vary their diet by resorting to the fruit itself. Of this class is the well known codling moth, (*Carpocapsa Pomonella*, L.,) found in the old as well as the new world, which eats its labyrinthine way through fruit, eventually metamorphosing into a brilliant golden and silvern moth.

The worm of the pretty little green geometrid moth, (*Aplodes Rubivora*, Riley,) eats the fruit of the raspberry; and I should here add yet another Lepidopterous pest, (*Penthina Vitovorana*, Pack.,) afflicting the grape, which it does by the maggot or larva entering the fruit and domiciling itself therein.

The Cotton-Boll worm, (*Heliothis Armiger* Hüb.,) also in some districts called the Corn-worm, is found in most parts of the world. I have examples from many parts of the United States and Territories, from Europe, Liberia, Australia, New Zealand, Chili, Brazil, and Buenos-Ayres. This wretch not only eats, as is too well known, the cotton bolls and young corn in the ear, but also the immature fruit of the tomato, cantaleup, and, without doubt, other fruits in their early stages. This is the species that has been confounded frequently with the true Army worm, (*Leucania Unipuncta*, Harr.,) which feeds on grass and grain, and which, likewise, has a wide geographical range, I having received it also, from Brazil, Buenos Ayres, Australia, and New Zealand, as well as from all parts of our own country. The worm of another small moth (*Pempelia Grossulariae*, Pack.,) burrows the fruit of the currant. In some genera of moths the worms bore into the stems of plants, or mine the solid trunks of trees; the best known of which, with us, is that producing the pretty steel-blue wasp-like moth, with yellow girdle, (*Sesia Exitiosa*, Say,) which bores the peach trees, entering them at the roots. Another mosquito-looking moth (*Sesia Tipuliformis*, L.) is the product of the worm which bores the currant stems,

Members of the genus of noctuids, called *Gortyna*, bore the stems or stalks of various annual plants. The corn borer, (*Achatodes Zeae*, Harr.,) as its name implies, bores the stalks of Indian corn; another species (*Gortyna Nitela*, Guen.,) burrows in the stalks of the potato and tomato vines, as well as in those of dahlias and other flowers. The locust and oak are burrowed by a large, tawny, maggot-like worm, the female of which is three inches long, the male scarcely two; this is the larva of the carpenter moth, (*Cossus Robiniae*, Peck,) which bores the solid wood of the tree, in diverse directions, and transforms to a chrysalis within one of the passages thus bored. When ready to emerge, this chrysalis, by means of the serrated edges of its abdominal segments, works itself to the end of the opening, and after the moth has escaped, the empty pupa case may still be seen protruding. The moth is about two inches across the wings in the male, and nearly three in the female; the latter is greyish, with fine net-like lines on the wings, especially on the primaries; the male is distinguished by yellow hind wings. This insect prefers old trees to young; the female lays her eggs in the crevices in the bark. In addition to its infesting the locust and oak, I have found it in an old orchard, emerging from a pound-apple tree. We have several other species of *Cossus*, (*C. Macmurtrei*, Bdl. = *C. Plagiatus*, Wlk., *C. Querciperda*, Fitch, etc.,) but these are all very scarce, too much so by far to cause the slightest apprehension of injury. In Europe there are, also, several species, all but two of which (*C. Ligniperda*, F., and *Zeuzera Aesculi*, L.) are great rarities.

But the vast Eucalypti forests of Australia are the true home of this class of insects. There numbers of monstrous species tunnel their way through these trees, the worm of one of which is seven or eight inches in length, and the moth produced from it is nine or ten inches across the fore wings.

The natives of this region, though caring nothing for the destruction of the trees, do not, however, allow the worms to carry out their devices in peace, for by the native gastronome they are considered one of the most desirable delicacies. Mr. Titian Peale related to me, that one day, during a sojourn in Australia, he saw the little native boys acting around the Eucalypti trees in a way which he could not understand. On approaching nearer, and convincing the little fellows that he was not dangerous, they went on with their operations; they had long straws, nibbed near one end into a sort of barb, which they gently insinuated into the openings in the trees made and occupied by the great Zeuzera and Cossus larva, they then angled away awhile until the disturbed monster seized the straw, when it was gently and dexterously drawn, still holding on to the straw, from its lair, and in a twinkling conveyed to the maw of the young savage, who enjoyed it with the keenest relish. The moths, also, after the wings and hair of the body have been singed off are considered a delectable *bonne bouche.*

But now I must turn from the subject of food plants, as I fear too much space has already been taken up. Let a word suffice to say, that every plant has not only its pest, but its many pests, and many of these, not content to prey on one plant, or even one class of plants, extend their ravages to many. The Arctians, which are hairy caterpillars, in their first stage are polyphagous, eating of almost every vegetable product. The larva of the Io moth (*Hypercheria Io*, Fabr. = *Varia*, Wlk.,) will eat willow, corn, cotton, poplar, wild cherry, sassafras, hops, gooseberry, rose, and other plants. The Cecropia moth (*Samia Cecropia*, L.) is also quite a general feeder. The Hickory Horned moth (*Citheronia Regalis*, Fabr.,) feeds on walnut, persimmon, rose, and other things, whilst its nearest relative is so particular as to diet, that it will refuse everything except pine, which shows but poorly for its taste. The Lithosians, a genus, or several genera of weak, delicate moths feed, in the grub state, on lichens. But, as a rule, I have found that the vilest, most useless plants were invariably the least afflicted by larval pests, whilst the cabbage is ruined by the larvæ of the Rape Butterfly, (*Pieris Rapæ*, L.,) the Zebra moth, (*Cèramica Picta*, Harr.,) and others. The strawberry must stand the ravages of its several leaf-rolling moth larvæ (*Anchylopera Fragaria*, Riley, *Lozontaenia Rosaceana*, Harr., *L. Fragariana*, Pack.,) as well as of the Dagger moth, (*Acronycta Oblinata*, Ab.—S.,) not to speak of the insects of other orders, especially Hymenoptera. The mullen and thistle wax mighty on the highways and road side, and the thorn apple (*Datura Stramonium*) holds undisputed possession, with the ash and garbage heaps, in every neglected out lot, not that they too have not their parasites, but in comparison with the legions that infest useful plants, these are as nothing. Nor are Lepidopterous larvæ confined in their depredations to vegetable productions only. The cloth and fur moths (*Tinea Tapetzella*, *T. Vestianella* and *T. Pelionella*,) subsist entirely in the worm state on the substances, from which they take their names. I might here mention, that the museum pest, (*Anthrenus Museœorum*,) which is such a curse to collections of stuffed birds and animals, dried insects, etc., will also devour woolen goods with as much avidity as its cousin, the dreaded Buffalo bug (*Anthrenus Scrophulariæ*); both of these, however, are grubs of beetles, not of butterflies or moths. It might not be uninteresting to make mention, also, of the fact that caterpillars of various species of the butterfly, probably, more than of the moths, will, from the dearth of their natural vegetable food, attack and devour their own or other species, and the taste thus begotten by necessity becomes so strong that in many instances they will thereafter refuse vegetable food and fall back on the gratification of their cannibal propensities.

There are a few plants that, under the law of retaliation, destroy insects. Of these, *Sarracenia Variolaris*, and Venus' fly-trap, *Dionea Muscipula*, are well known. The insects which are unwary enough to get into the pitcher like leaves of these and allied plants, are held imprisoned by a viscid matter that covers their inner surface. But I would specially mention an insect destroying plant, not as familiar as these, which belongs to the Asclepiad or milk weed family, and is indigenous in some parts of South America. A friend in Georgia has one of them, which he tells me came from Florida, though it may have been originally brought from South America to that State. Its proper name is *Araujia Albens*, (*Physianthus Albens* of some authors,) and it is well known in green-houses here as well as in gardens; it has rather small white flowers, shaped somewhat like those of the common species of milk weed, but not growing in such clusters. To these flowers are attracted a great number of insects of various orders, every one of which meets slow but sure death in the grip of the flower. The moment the small Hymenopter inserts his head he is a prisoner; no struggles will avail to free his head from this floral vise. The thread-like tongue of the butterfly or moth is not slender enough to escape the deadly embrace, and there the unfortunate insect struggles vainly on, held fast by head or tongue, until life is extinct.

Of moths and butterflies that are beneficial but little is to be said. They are beautiful and most interesting objects of study in all their stages, and in all parts of the world. They are attractive even to the unscientific lover of the beautiful, but when it comes down to any actual benefit to be derived from the productions or services of any of them, if we except the few that are used as food, we must fall back on the silk worm of commerce, (*Bombyx Mori*, L.) and its less generally known silk producing congenors. So much has been written and is known in regard to the former that it would be absurd to made any repetitions here; but it is not so well known that several other much larger and gaily ornamented species are also silk producers, from whose cocoons silk is largely obtained and manufactured in India and Japan. Among these are prominent the Cynthia moth (*Attacus Cynthia*, Dru.,) the Pernyi, (*Antheraea Pernyi*, Guer.,) of China, and the Jama-Mai, (*Antheraea Jama-Mai*, Guerin,) and Ricini, (*Attacus Ricini*, Bdl.,) of Japan. The first of these, the Cynthia, has been introduced, and for many years acclimated in New York, Pennsylvania, and Maryland, where it feeds and thrives vigorously on the ailanthus; no efforts have been made, at least to any extent in this country, to utilize its silk, though it has, probably, been manufactured for ages in the presidency of Bengal, in India. This silk is coarse, but of exceedingly great durability. The silk of the Mylitta or Tusseh silk worm, (*Antheraea Mylitta*, Guerin,) is also manufactured in Bengal and other districts in India. Our native silk spinners are the Polyphemus, (*Telea Polyphemus*, L.,) Luna, (*Actias Luna*, L.,) Promethea, (*Attacus Promethea*, Dru.,) Angulifera, (*Attacus Angulifera*, Wlk.,) Cecropia, (*Samia Cecropia*, L.,) Columbia, (*Samia Columbia*, S. T. Smith,) Ceanothi, (*Samia Ceanothi*, Behr.,) and Glover's silk worms, (*Samai Gloveri*, Streck.) The first four produce compact tight cocoons, the others, especially Cecropia, loose ones. What value these may have commercially is yet to be proven, though Mr. Trouvelot experimented largely with Polyphemus some years ago, but with what success I am unacquainted. They are large showy moths in their perfect state, and Luna, with its long tailed hind wings, delicate pale sea-green color, is the most lovely of all our moths and will compare in beauty with those from any part of the world. Cecropia is our largest species, dark heavily furred, and with reddish bands. It reminds one of the dusky blanketed forms of our own North American Indians, much as the fanciful speckled wings of the Chinese Agamemnon butterfly, (*Papilio Agamemnon*, L.,) engender thoughts of tea chests, porcelain vases, and small footed ladies. The cocoon produced by Glover's silk worm (*Samia Gloveri*, Streck.,) resembles arborescent native silver; it is irregular and deeply burrowed, and in color exactly like frosted silver. This species is from Utah, where its larva abounds on gooseberry bushes, both wild and cultivated.

Long years ago, Abbot asserted that the silk of the Cecropia moth had "been carded, spun, and made into stockings."—See Naturalists' Library, Vol. VII, Entomology. Before closing my remarks on silk moths, I might as well add, that the larva of one of them (*Attacus Vacuna*, Westw.,) is also eaten by the natives along the Ogowai river in Ashanti, (according to a statement accompanied by a figure of the moth in the *Scientific American*, No. 150, page 2394, November, 1878,) which will further extend the small list of species useful to other animals.

The enemies which attack butterflies and moths in the larva or worm state are legion, and among these are man's best friends in the insect world. They are mostly from the orders of Hymenoptera, Hemiptera, and Diptera. The first and last deposit their eggs in the living worm, and when hatched they devour their unwilling foster parent. The Hemiptera, to which belongs man's warmly attached follower, the bed-bug, (*Cimex Lectularius.*) impale the living larva on their sharp beaks, and suck its juices and life out together.

One species of this latter class has been especially useful in lessening the numbers of the worm of the cabbage fly, (*Pieris Rapæ*, L.) A large Ichneumon fly (*Ophion Macrurum*, L.) of a reddish rust color, lays its eggs in the larva of the Cecropia, Polyphemus, and other species of moths and butterflies. These eggs, when developed, produce a maggot, which eats ut the substance of the moth larva. When it is full grown, it makes its own cocoon within the shell of the larva, and in the following spring emerges a perfect wasp-like insect, ready to reënact the same role as its progenitor of the season previous. The Chalcis flies, (*Chalcis Maria* and *Cryptus Nuncius*,) are also parasitic in the larva of Cecropia and allies. The Tachina fly, (*Exorista Militaris*, Walsh,) a dipterous or two-winged insect, is another unwelcome guest to the entrails of sundry Lepidopterous larvæ. Size will not exempt them from destructive parasites, for that minute apple pest, the codling moth, is destroyed by two still smaller ichneumon flies, (*Macrocentrus Delicatus*, Cress., *and Pimpla Annulipes*, Br.,) whose grubs prey on its larva, as do those of the Ophion, etc., on the larger species. Another ichneumon fly (*Pteromalus Puparum*, L.,) infests that imported nuisance the oft-mentioned cabbage worm, (*Pieris Rapæ*, L.) This little ichneumon is, in the winged state, a most brilliant golden little fly. *Darapsa Myron*, one of the Hawk moths previously spoken of as feeding on the grape, is frequently infested with the larvæ of a small ichneumon fly. These larvæ, after eating the substance of the worm until they are mature, come out through its skin, and make their small white cocoons on the outside fast to its body, giving it a most novel appearance. Butterflies, moths, and other insects, as well as their larvæ, are infested with the Gordians, commonly known as hair worms, which are the long, white, thread-like worms sometimes seen in puddles, varying in length from four or five inches to two feet. The large species is sometimes found within living butterflies, grasshoppers, crickets, etc., and a small species is not infrequent in the body of the grub of the apple or codling moth. Besides these animal parasitic enemies, and the birds and dragon flies, vegetable parasites are also found which prey on either the larva or perfect fly.

One species of these affected the silk-worm in Europe to a most disastrous extent. I have had larvæ of the *Polyphemus* moth to die from being affected by a minute fungoid growth. In my possession is an example of a Hawk moth, (*Sphinx*,) in the winged or perfect state, which has a fungus growth issuing from all parts of its body, head, and wings, in filaments varying from a mere point to an inch in length. These issue from the sutures, between the abdominal segments, from the juncture of the wings with the thorax, and between and around the legs, and bristle, porcupine-like, in all directions. I have seen another example, (belonging to Mr. T. Mead, of New York, if I recollect rightly,) also a Hawk moth, but smaller than mine, and not so densely covered with the fungus. Examples of similar growth are exhibited in the figures of Sphingidae, in Cramer s " *Papillons Exotique*," on Plate 267, Figs. A, B. I have also had a beetle from Brazil which had some curious growth, analogous to these here cited, and which, in some places, seemed to have pierced and grown through the hard, horny elytra or wing-cases. Most persons who have paid any attention to economic entomology, will recollect the figures of large beetle grubs, with two long filamentary vegetable growths issuing from the neck, that appeared some years ago in the American Entomologist, and other scientific publications. Whether the growths mentioned above as occurring in the Hawk moths, (*Sphingidae*,) were after the death of the animals or prior thereto, will be, of course, matter for supposition; but that they afflicted the insect whilst alive is not impossible, or even improbable, as Prof. Riley mentions that " according to Dr. Carpenter, it is not at all unusual, in the West Indies, to see wasps, (genus *Polistes*,) flying about with plants of their own length projecting from their bodies;" and we all know of the fungus that attacks the common house fly, glueing it to the window-panes and adjoining wood-work.

The diversity in form and appearance of Lepidopterous larvæ is as amazing, and even more interesting than the wondrous beauty of the perfect fly. The worms of the Swallow-tail butterflies (*Papilio*) are, in some instances, covered with long, fleshy processes, as are those of the splendid Malaysian Priamus butterfly and allies, and our own brilliant blue Philenor butterfly (*Papilio Philenor*, L.,) others are of the shape of snails, thickest in the middle and tapering at either end. To this class belongs our graceful Ajax butterfly, (*Papilio Ajax*, L.) Others are swollen near the head, as in the Troilus, (*Papilio Troilus*, L.,) which feeds on the sassafras. All of the species belonging to this genus protrude at will, when disturbed, from the neck, a fleshy yellowish or pink Y shaped process, which emits a disagreeable smell.

The worms of the White Butterflies, (*Pieris*, *Colias*, etc.,) conspicuous amongst which are the everlasting cabbage pest, (*Pieris Rapæ*,) and the common yellow mud butterfly, always seen congregated in wagon ruts and puddles in country roads, are mostly green and inconspicuous, not easily to be distinguished from the leaves on which they feed. The little blue and copper butterflies (*Lycaenidæ*) of our own meadows, are produced from small, oval, apparently footless larvæ. By the way, it is well worth while to mention of these Lycaenid larvæ, that a sweet juice exudes from their bodies, which is greatly sought by ants, who will not injure the worm, but on the contrary take all possible care to do nothing to annoy it. In the pearl spotted butterflies, (*Argynnis*,) the painted lady, (*Pyrameis Cardui*, L.,) the Atalanta, (*P. Atalanta*, L.,) etc., the caterpillars are covered with long, rigid, sharp spines, The Skippers, (*Hesperidæ*,) a large family mostly of small butterflies that fly by jerks, hence their name, have smooth, pale worms, tapering at each end, and with thin necks and enormous heads. The Hawk moth-worms, (*Sphingidæ*,) among which are the tobacco worm, (*Sphinx Carolina*, L.,) the clear wing humming-bird moth, (*Macroglossa Thysbe*, Fabr.,) etc., are in most cases known by a long, pointed, somewhat curved horn, on the top of the last joint of the body, which the uninitiated generally mistake for its head. The monstrous and ferocious looking green worm of the hickory horned moth, is furnished with eight large curved horns on the neck, but formidable as this monster seems, it is perfectly harmless, and unable to cause any injury.

Not so, however, with the curious Io moth worms, which feed on corn, willow, cotton, and many other things, and the Maia worms, (*Hemileuca Maia*, Dru.) These are covered with branched processes or spines, which, if the worm be handled, cause excessive pain and redness of the parts of several hours duration. The first of these is pale pea-green, with a narrow red and white stripe along the whole length of each side. The other is yellowish, with red spots on the back and a stripe on each side. To these stinging caterpillars I should add the remarkably shaped footless larvæ of some of the Limacodes, the best known of which is the common saddle-back worm, (*Empretia Stimulea*, Clem.,) which every one having rose bushes has at one time or another observed. It is a chunky, square sort of little fellow, an inch long, of a dark chestnut color, with a large pea-green saddle-shaped mark covering the back and sides. In the center of this mark, on the back, is a circular patch of the brown color. This worm has four fleshy horns covered with short bristles, two at each end of the body; and woe betide the one who meddles with these with unprotected hands, or allows them to come anywhere in contact with the bare skin. Phew! nettles are nowhere. Another of these Limacodes larva (*Limacodes Pithecium*, Ab.-S.) is flat, of a uniform dark-brown color, with four long curved fleshy arms or hooks issuing from each side at right angles. These appurtenances become detached very easily if the worm be handled, and it contrives to take them off itself before spinning its pupa case, to the outside of which it attaches them as trophies or atrophies. This little worm has a Victor Hugo devil-fish sort of look, but cannot sting, and is perfectly harmless. The small larvæ of the moths of an allied genus (*Lagoa*) look exactly like a close bunch or tuft of wool or raw cotton. Apropos of this subject of stinging caterpillars, I saw a year or two, or more since, in one of the New York weekly story papers, that sports a "science column," a long account of stinging larvæ found in Australia, copied from the proceedings of some scientific society, I believe. This was all so far very well, but unfortunately the editor of this same science department found it necessary to supplement the article with a few original observations of his own, the principal one being a bare-faced assertion that stinging larvæ were so far only found in Australia. Some one should have sent him some of our common saddle-back worms, or those of the Io moth, to convince him practically of the error of his ways. I did drop him a note stating that we had several common species of stinging larvæ in this country, which had long been well known, but no correction of his mistake appeared. I related the incident to friend Fuller, then of the *New York Rural*, who comforted me by exclaiming, "What! do you think a newspaper would correct its own errors? An editor can never make mistakes." We both laughed heartily, for friend Fuller would have been the first to correct his own or anybody else's mistakes as soon as he became aware of their existence; but the above shows badly for that great enlightener of the masses—the popular public press.

In the Harpyiæ, (*Cerura* of American authors,) the extremity of the body is armed with two long horns, each of which encases another horn which the animal darts out when annoyed. Every one is acquainted with the beautiful brush tufted caterpillar, with its bright red head, four short yellow brushes set in the black velvet of its back, and two long feathery tufts at the head, and one at the tail; it is the worm of that nuisance the Tussock moth, (*Orgyia Leucostigma*, Abb.-S.,) whose cocoons, with the white froth-like substance on them that covers the eggs, are found everywhere. The perfect insect is a very inconspicuous thing, the male being a small gray moth, and the female, which is wingless, has much the appearance of an over-fed maggot. Many larvæ resemble, whilst at rest, so closely the substances on which they repose, that their presence will often fail to be detected by the most practiced eye. Among such I might mention the Lappet moths (*Tolype Velleda*, Stoll., *T. Punctistriga*, Wlk.) These, when at rest on the trunk of an apple tree, the leaves of which are their favorite food, so closely resemble in color the bark, that it is almost impossible to discover them. Nor must we allow the curious measuring or span worm (*Phalaenidæ*) to pass unnoticed; these have the habit of holding on to a limb by their anal or last pair of legs, and allowing the body to stand rigidly out at an angle of about fifty-five degrees, and when in this position, further aided by their green or brownish color, the eye may rest on them without a suspicion that they are animate objects. When in motion, owing to the distance between the legs and prolegs being so great, they curve up their body at every step in the form of an arch or horse shoe, hence their name of semi-loopers.

Whilst on this subject of the resemblance of larvæ to other objects, commonly though improperly termed mimicry, it might not be amiss to recur to a few instances of this so-called mimicry in the perfect insects, the moths and butterflies. Foremost among these I would name the *Catocalae*, or underwings. These are mostly large moths, frequenting the trees in our woods, on various kinds of which their larvæ feed. The body and upper wings are grey or brown, variously mottled in darker shades and marks. The lower wings are either bright red, or yellow with black bands, or else entirely black; and one exceptional species in this country has the hind wings black, with a white cross-band. When at rest the grey or brown upper wings entirely cover and conceal the conspicuous-colored underwings, and when the insect is in this position on the trunk of a tree, which is its general resting place, it assimulates so closely in appearance to the bark and the lichens growing thereon, that it is detected with difficulty, even when searched for; and what is still more curious, is that the paler species appear always to rest on bark of some analogous color, and the darker ones on that simulating their color. One species (*Catocala Cara*, Guen.,) has the upper wings of a far deeper shade than in most of the other species, appearing, at a casual glance, to be almost black; and, strange to relate, in a piece of woods where I was collecting on one occasion, all the examples of this species which I found were clustered on some huge black warty excrescences on an old tree, the color of which was nearly the same dingy hue as the wings of the insect. This is no isolated instance, but the rule, not the exception. It is this resemblance to lichen, etc., that has caused them to be called in France Lichnées, as Lichnée Bleue, for the blue-banded underwing; Lichnée Jaune, for the yellow, and so on.

Another moth, belonging to a different family, known as the American Lappet moth, (*Gastropacha Americana*, Harr.,) when at rest precisely resembles, both in shape and color, a dead leaf; hence the name of Feuille-Morte, given to an allied species, (*Gastropacha Quercifolia*, L.)

Other Lepidopterous insects resemble wasps and bees; the moths of the peach, currant, and other borers, (*Sesiidæ*,) are complete counterfeits of Hymenopterous insects, excepting that they are powerless to sting.

The clear-winged Hawk moths (*Macroglossa Diffinis*, Bdl., *Axillaris*, G.—R., *Æthra*, Streck., etc.) are the counterparts of large bees, their bodies being thick, short, and covered with black and yellow hair, and their wings, excepting the narrow outer margin, are devoid of scales, and are clear as glass, which makes the deception complete. From this resemblance, one of the common European species is known as *M. Bombyliformis*, or the bee-shaped Hawk moth. What still further aids the deception is that all these bee and wasp resembling moths fly in daylight, not during the night, as do the vast majority of moths. A class of true day butterflies, common to tropical America, belonging to the genus *Ithomia*, also have the wings nearly devoid of the colored scales, and, consequently, are quite transparent; this, in addition to their slender, needle-like bodies, gives them considerable resemblance to dragon flies and other neuropterous insects. Not the least curious instance of involuntary mimicry is the remarkable resemblance which some butterflies and moths bear to others of entirely and widely distinct genera, or even families. In our own country we have an instance in the common reddish Misippus butterfly, (*Limenitis Misippus*, L.,) which is the close counterpart in shape, size, color, and markings to another common species, the Plexippus, (*Danais Plexippus*, L.,) which belongs to the Danaidæ, a family widely separated from the first, which is one of the Nymphalidæ. In Florida and other southern States is another species of Danais called Berenice, (*Danais Berenice*, Cr.,) which is dark brown, instead of the bright rust red of the more wide-spread Plexippus. Now the first mentioned species, Misippus, likewise occurs in the same localities as Berenice, but, curious to relate, instead of being of the bright red color that is one of the leading features in its resemblance to Plexippus, it is in these southern examples of the same deep brown as Berenice. This Misippus butterfly, I should add, is the only one of its genus that is red, the typical colors being black or dark brown, with a white band crossing the wings, whilst the species of that group of Danaiæ to which Plexippus and Berenice belongs are of reddish rust color, of darker or lighter shades.

In connection with the preceding, I will mention the more curious, though analogous, case of the Chrysippus, (*Danais Chrysippus*, L.,) which occurs in most parts of Africa, Asia, the Pacific islands, as well as in south-eastern Europe. This is, in its ordinary form, of a paler red than our Plexippus, more inclined to yellowish; otherwise marked much in the same way. In Senegal there is a variety of it with white hind wings, (*Danais* v. *Alcippus*, Cr.,) and in Syria and Abysinia is an aberrant form, in which the white spots contained in the black patch near the points of the front wings, in the common form, is wanting. This variety is known as the Dorippus. (*Danais* v. *Dorippus*, Klug.)

There is a genus of beautiful butterflies in the family of Nymphalidæ, called Diadema, whose colors are black, with bluish shades or patches, and in the shape of the wings it is fuller and rounder in outline than the aforesaid Danais butterflies; but now mark: the female, and that sex only, of one single species of these, (*Diadema Bolina*, L.,) departs entirely from the normal black and blue forms to such an extent as to resemble so closely the yellowish red Chrysippus, not only in color and ornamentation, but even in shape, as to be almost undistinguishable from it. But, further, this female Diadema, when occurring in Senegal, sometimes varies in having the hind wings whitish, like the variety of Chrisippus previously alluded to from that country under the name of Alcippus. Again, in other instances it is found entirely without the white spots and black patch of front wings, thus becoming an exact imitation of the other variety Dorippus. All the males of the butterflies of the genus Danais have, on the second median nervule or vein of the hind wings, a small, hard, black knot-like spot, which is a sexual distinction, the females being entirely without it. So, to make the imitation still more nearly perfect, in the female of the Bolina butterfly there also are no traces of any such spot. So close is, in fact, the outward resemblance between these generically widely different insects, that the old authors figured and described them as one and the same. Nor have I yet done with this marvelous freak and its adjuncts, for, "like the circle that ever returneth in to the selfsame spot," it has led us back to the starting-point of this topic, the Misippus butterfly; for in this also occurs a variety in which the white and black spots and marks near the apices of the front wings are entirely gone, thus keeping up the same form exhibited by the varieties of the other widely different insects Chrysippus and Bolina. I might go still further, for in the green-colored butterflies of the African genus *Romalæosoma* there is another of those red mimics. But I will cease, for the subject is a vast one, and as yet a mystery profound, even to science, which is utterly at a loss as to what are the causes. No one would imagine that these are the wild freaks of chance. Nature is methodical. Her law, like that of Heaven, is order. Everything is done in beautiful harmony. That this resemblance in these instances is for protection, as is strongly advocated, I do not believe.

The species of Danais butterflies that are mimicked are nauseous and unpalatable to birds and predatory insects, and thus enjoy perfect immunity from such foes. It has on this account been reasoned that the Misippus, which resembles them, enjoys like immunity, on account of its livery being like theirs, and so totally unlike that of all its relations. This, however, is without a particle of foundation, beyond that existing in the imagination of its originators. The other species of Limenitis butterflies, (the genus to which *Misippus* belongs,) are just as common, sometimes more so where circumstances and surroundings are favorable. In the wilds of Luzerne county, Pennsylvania, I saw, probably, one hundred of the Arthemis, (a species belonging to the same genus,) to every one of the Misippus, and it was not for want of foes that either escaped, for the dense forest was alive with birds, and the lace-like wings of the dragon-flies, (*Aeschna*, *Agrion*, etc.,) glistened as they darted here and there, or hovered in mid-air over the pools and trout streams. In our neighborhood, near Reading, another species, Ephestion, (*Limenitis Ephestion*, Stoll,) which is black and blue, is found in about equal numbers with Misippus. In some localities, more westward, the first is commoner than the last named species. In South America the glades in the forests swarm with certain long narrow-winged bright-colored butterflies, belonging to various genera in the Danaidæ and Heliconidæ, which birds will not eat owing to their disagreeable taste and smell. These have analogues in appearance, which, for convenience sake we will call mimics, in several other families, especially among the Pieridæ, or white butterflies, and in the Melitaeæ, a genus of small butterflies, the normal forms of which have wings of a reddish or tawney color, marked with black. Now the genus of the Pieridæ, which mimics the narrow winged unpalatable Heliconidæ, and which technically is known by the name of Leptalis, contains just about the scarcest of all the butterflies in that family, and the nearer they approach the Heliconidæ in appearance, the scarcer they are in nearly all cases; and the commonest of all are just the ones which recede furthest from the Heliconidæ and approach nearest to the typical broad winged, white Pieris butterflies. Any one who has collected exotic butterflies will bear me out in this statement as to the extreme rarity of the species of Leptalis.

In every collection coming from Central or South America, will be found great numbers of common forms of white and yellow Pieridæ, but seldom indeed more than a few, if any, of the aberrant Leptalid forms which resemble so closely the Danaidæ and Heliconidæ. But I have digressed, and must return to the matter more directly under consideration. The resemblance of butterflies to other objects, is not confined to the perfect insect, or even to the larva or caterpillar only, but also to the chrysalids and cocoons, or pupa cases, which they construct. All collectors know how difficult it is to detect the cocoons of the larger moths, Cecropia, Promethea, etc., from the dead leaves that surround them. And to every one is also known the curious sack which contains the worm, then the chrysalis, and lastly the eggs of the moth, commonly known as the bag worm, or drop worm, (*Thyridopteryx Ephemeraeformis*, Steph.) This is formed of silk by the worm, and covered with bits of leaves and stems of whatever particular tree it has favored. For this species is a general feeder, attacking anything from a gooseberry bush to a pine tree. The male only is winged, and its wings being transparent and narrow, it resembles some bee or fly more than a moth. The female receives her mate without leaving the sack in which she afterwards deposits her eggs, and then only for the first and last time during her existence, does she quit it to fall to the ground and die. In some exotic species, the female remains in the sack after she has laid all her eggs, and dying there, becomes the first food the young larva consumes after emerging from the egg. Most of these insects are embraced in the two genera, *Oiketicus* and *Psyche.* Ours and those of Europe are very pigmies aside of some from the tropics, for instance the *Oiketicus Saundersii*, of Westwood, from Australia, the female of which forms a sack seven inches long.

One species in Tyrol, in which both sexes are winged, (*Typhonia Lugubris*,) forms its sack with grains of sand, in the form of a long cyndrical tube. Most curious of all, composed of like material, in the form of a snail shell, is the pupa case of *Psyche Helix*, figured in Siebold's Parthenogenosis. So deceptive is the appearance of this and allied species that one kind, found in the Atlantic States, from Nova Scotia southwards, which is presumably of some species of Psyche, was actually described, by the conchologist Lea, as a shell, under the name of *Valvata Arenifera.*

Of insect architecture, which is partly embraced in the foregoing, I have not space to add much more than to allude to the enormous webs, sometimes nine or ten inches in diameter, spun by colonies of worms, the larvæ of the Lacquey moth, (*Clisiocampa Americana*, Harr.,) on our fruit trees. From the hole in this web tent emerge the throng of worms in military order, twice daily, (morning and afternoon,) to feed on the surrounding foliage; on rainy days they remain indoors, and do not feed. When full-grown, they break up house-keeping, and disperse, each one going its way in search of some suitable place to spin its cocoon. These worms are a great nuisance, but as they live in company, in their large, conspicuous tents on the trees until mature, they are easily destroyed. Another allied species (*Clisiocampa Sylvatica*, Harr.,) lives on our forest trees.

Whilst on the subject of mimicry in butterflies, I had intended to make some reference to monstrosities, and will devote some space to the same. It sometimes happens that from a brood of caterpillars, emerged from a batch of eggs laid by one female, there will in due time be among the butterflies therefrom produced one that differs in coloration and marking—

sometimes even in shape—from all the others of the same brood. These freaks or aberrations are sometimes far handsomer than the normal form, and always of great interest, as we can have so little idea of the causes producing them. In most cases they are unique, and remain so, but more seldom they are repeated, turning up again at long intervals. The common painted lady butterfly (*Pyrameis Cardui*, L.,) occurs sometimes with the underside of the wings almost wholly white. and the upper side with the red-ground color crowding out the black to a large extent. In others it is just the reverse, the black obscuring most of the wings on both surfaces. Of this black form I know of two examples, one in Europe and one in my own collection. Trimen also mentions examples taken at the Cape of Good Hope. Of the first, or white aberration, besides Rambur's type, and the original of Herrich-Schäffer's figures, I am aware of the existence of five—one in Europe and four here. Of the latter, I have the good furtune to possess one; and there was a curious coincidence in my obtaining it. A few weeks since I was at the Academy of Natural Sciences, of Philadelphia. Whilst there I noticed on a table a number of books and pamphlets, lately received, among them a late number of the Annales Sociétè Entomologique Belgique. In turning over its leaves, I lighted on a plate with five figures, the upper two resembling the black form alluded to, and the next the white aberration, taken from examples recently captured. I closed the book with a despondent feeling. There, I thought, some one else has had the luck to get that wonderful thing; I don't suppose I'll ever be so fortunate. The day had been cold, and drizzling rain kept up unceasingly. I had a wretched cold myself, and as the shades of evening came on I debated whether I should spend the evening with my friend Blake, curator of entomology at the academy, or creep into the dreary confines of a hotel room and snooze off the blues. Still debating the matter, I listlessly walked on in the direction of my friend's domicile, and at last as listlessly reached it, where warm welcome and friendly faces banished the blues and my weariness. "By the way," said my friend, "I got, from so and so, a pale *Cardui*. He caught it down near the sand-pit, and had it pinned in one of his butterfly pictures." "I suppose it is faded from being hung up in the picture, not so?" I responded. "You will see it after supper," he said. There it rested. An hour or two later, in looking over his collection, when the box containing the Vanessans was opened, lo and behold there, pinned, reverse side up, was the counterpart in nature of the picture I had seen a few hours before at the academy. I thought of clairvoyance, of second sight, and of more things than are dreamed of in our philosophy. To end the story, my old friend, with his usual good heartedness, presented me with the wonderful insect, which now is one of the choicest adornments of my cabinet.

Some monstrosities have the marks of the wings of one side different from those of the other. I have seen an example of the Utah silk worm moth (*Samia Gloveri*, Streck.,) a species allied to our Cecropia, which had the left wings of the normal dark red color, whilst those on the right were entirely white. I have given a figure of this curious sport on Plate 14 of the indigenous and exotic Lepidoptera. Others occur which are entirely albinous. I received not long since, from Germany, an example of *Epinephile Hispulla*, Hüb., a butterfly that, normally, is dark brown, which was an albino, having all the marks of the ordinary form faintly defined; but the brown ground color, peculiar to the whole insect, was replaced by yellowish white. Of our common yellow mud butterfly, I have examples that are entirely black. These, of course, are only freaks, and do not reproduce their kind; but other aberrations have became, through change of climate, food, or other causes but imperfectly known, to all purposes, species, producing their kind from season to season. Thus the Cynthia silk worm, acclimated with us many years, is no longer the Cynthia of China, its original progenitor. The strongly falcate narrow wings of the Asiatic type of Attaci is replaced by the broad rounded form of those of North America, as in *Cecropia* and *Angulifera.*

The great tiger moth (*Arctia Caja*, L.) has, in North America, a white collar. In European examples, this adornment is only occasional, being the exception, not the rule; but both American and European examples have orange colored hind wings. In Asia Minor, (Amasia and Tokat,) the female only has the orange hind wings; in the male they are pure white. In British Columbia, the common swallow tail butterfly (*Papilio Turnus*, L.,) is small, and the female is always the same yellow color as the male. In Pennsylvania, and southwards, it is a dimorphic species, having two forms of females; one yellow like the male, the other entirely black. So I might go on; but this is enough to illustrate the subject.

Among the butterflies true hermaphrodites occur, at least as far as all outward signs exhibit. In my possession is an example of the common dimorphic swallow-tailed butterfly just mentioned, in which the right side of the body and two right wings are yellow and male, and the left half of the body and left wings are black female. The division of the sexes is perfect, in this example, even to the anal valve on the male side.

Another instance is of the *Promethea* moth, (*Attacus Promethea*, Dru.,) in which the right wings and right half of the body, the head, and both antennæ, or feelers, are male, and the left half of the body and both left wings are female. I have also an example of the Io moth, (*Hypercheria Io*, Fab.,) which is still more curious; the body, the left antenna, the left upper wing, and both right and left hind wings, are male; whilst the right antenna, a small patch on the right side of thorax, and three fourths of the right upper wing, are female, and the one fourth, along its inner edge, is also male. This sexually was doubtless male, as it was captured whilst endeavoring to copulate with a female which had newly emerged from the chrysalis in a friend's house, in Hudson City, New Jersey. Of this mixed up sort of hermaphroditism, I have also two examples of the Philenor butterfly, (*Papilio Philenor*, L.,) in which parts of three wings are male, and part female. An example of the Promethea moth of this kind is recorded in the fourth volume of the Proceedings of the Entomological Society of Philadelphia.

An example of the Castor butterfly, (*Papilio Castor*, West.,) is figured and described in the Wiener Entomologische Monatschrift, in which there is the same utter confusion of sexes. Others are recorded, and in various collections, but I have cited enough to give some fair idea of this species of abnormity, though I will yet add that there is another form, known to have occurred in some Hymenopterous insects, though never so far in butterflies or moths. It is where the thorax, head, and front wings are of one sex, and the abdomen and hind wings of the other.

Another curious monstrosity has occurred in the female of the common swallow-tail butterfly, (*Papilio Turnus*, L.) This species, as I have mentioned, has two kinds of females—one black and one yellow. In the example I now allude to, the two wings on one side, and half the body towards the same, are yellow, and the other half of the body and two wings are black. At first appearance it looked like the hermaphrodite previously described, but closer examination showed it to be a blending of the two forms of one sex. Those persons who have one eye blue and the other brown are, I suppose, somewhat analogous examples in the higher animals, though if one existed which was longitudinally divided into blonde and brunette half and half, it would be a better illustration still.

Another form of monstrosity is that produced by the pairing of the male of one species with the female of another. The offspring of such illicit intercourse partakes of the character of both parents, most curiously and beautifully blended. A very curious thing in regard to these hybrids, emanate they from what species they may, is that they are invariably of the male sex. I never saw or knew of any of the other sex being recorded as having occurred. Nor is the production of hybrids of sufficient rarity to cause the surmise that we know of too few examples to base such a belief upon, as of several species in Europe they have been produced in confinement by the hundred, as in the case of the pairing of the eyed willow Hawk-moth (*Smerinthus Ocellatus*, L.,) with the poplar Hawk-moth, (*S. Populi*, L.) Whether bastards are able to aid in the reproduction of species by coupling with examples of the species of either parent, I am unable to say, but doubt very much if they can.

Having now treated of variations, etc., it might not be amiss to say something in regard to the geographical distribution of species and their bearing to each other, in the different parts of the world, as well as express some ideas in regard to the belief that they are all but the emanations from some one original form, existing many millions of years since; as I am no believer in the especial creation of each species, which doctrine is directly disproved by the fossil butterflies, of which, as far as have been discovered, not one is of any species now known to exist. Moreover, a careful study of the moths and butterflies of different parts of the world will show how wondrously they are linked together, not only in a continuous line, but interlinking, as the rings in a coat of chain armor, and that, too, by species and genera in countries as widely remote from each other as Buenos Ayres and Australia. The forms found in some genera or groups seem none of them to have yet died out, as for instance in some groups of the Asiatic genus *Euplœa*, in which no man can tell which are species or which varieties, one has only the choice of designating the whole group as one species, or of making a species of every individual example.

But now to speak of the geographical distribution. The butterflies of Labrador, British Columbia, that part of the United States and Territories on the Pacific side of the Rocky Mountains, Persia, Siberia, Europe and northern Africa, (Algiers, Morocco, Tunis, and Egypt,) are in a great measure analogous, and in some instances species are identical. The Antilles, Mexico, Central America, and South America, exclusive of Chili, Buenos Ayres, and Patagonia, have a fauna of their own, wonderful for its diversity and glorious beauty, and they are the richest sections in the whole world in these insects. Many more species may be taken within a circuit of forty miles near Para than are found in all Europe. India, the southern half of China, and the Malaysian and Australasian islands have another and distinct fauna, also great in numbers of species, remarkable for strange form and splendid coloring. In Australia, in this as in the other animals, there is a tendency to some departure from the forms of the neighboring islands. Africa, excepting Egypt and adjacent parts, and those parts north of the Great Desert, has its own peculiar fauna, to which that of the neighboring great island of Madagascar assimilates. Of Thibet and Central Asia we as yet know next to nothing.

Now, having taken a cursory view of the disposition of the Lepidopterous fauna in most parts of the world, including our own western coast, we will direct our study to that of the portion of the United States east of the Rocky Mountains, which we will find, in many instances, partaking of the character of those from most other countries. The nearest analogue to the great bird-wing butterflies, (*Ornithoptera Priamus*, etc.,) of Malaysia and Australasia, is found in our *Philenor* butterfly. Our Troilus butterfly is also nearly allied to Asiatic species, but not to any one in the new world. With the exception of *Phaeton* and *Harrisii* (*Melitaea Phaeton*, Dru., and *M. Harrisii*, Scud.,) the analogues of our Melitaea, (*Eresia* of some authors,) a class of little orange or rust colored butterflies, are to searched for in Brazil, and other parts of tropical America; whilst the species of the same genus, west of the Rocky Mountains, are the closest allies to European and Siberian species. The species nearest to our only two Aurora butterflies (*Anthocharis Genutia*, Fab. et A. *Olympia*, Edw.,) are one (*A. Scolymus*, Butl.,) in Japan, and the other (*Zegris Eupheme*, Esp., etc.) in South Russia and Turan. Of the two species of Colias we possess, the common yellow butterfly, found sitting near puddles and in wagon ruts, is, without doubt, a modification of the sub-polar Pelidne butterfly (*Colias Pelidne*, Bdl.) Of the curious long-snouted Libytheidae we have our share, three being at home here. These are, however, doubtless all forms of one species; besides these, there are ten others—one in Cuba, two in Hindostan, one in Ceylon, three in the Malaysian Islands, one in Europe, and two in Africa. The nearest species to our superb Diana butterfly (*Argynnis Diana*, Cram.,) is found in the Chinese Sagana, (*Argynnis Sagana*, Dbldy.—Hew.) Our Semidea butterfly, found only on the summit of Mount Washington, in New Hampshire, has its true home in north-western Labrador.

Now, turning from the day butterflies to the moths, we find that our peerless Luna moth (*Actias Luna*, L.,) belongs to a genus whose other members are found only in India and Africa. For the nearest kin to our Promethea, Polyphemus, and other large silk spinners, we must also look to Asia and Africa. Of the underwing moths, (*Catocala*,) the United States and Territories have more than double the number found in all the other parts of the world together. In Arizona, as far as the comparatively small portion of species known will allow us to judge, is exhibited in a large number of species a tendency to pale or albinous forms, the most remarkable of which is the Alma butterfly, (*Melitaea Alma*, Streck.,) which is an albino analogue, or variety, perhaps, of the Californian Leanira butterfly, (*M. Leanira*, Bdl.,) and *Sphinx Elsa*, a Hawk moth, which is a white representative of our more eastern Plum Hawk moth, (*Sphinx Drupiferarum*, Abb.-S.,) also, the wonderful white female of the Nokomis butterfly, (*Argynnis Nokomis*, Edwd.,) a probable variety of our Cybele butterfly, (*A. Cybele*, Fabr.) That the saltness and dryness of the arid regions producing them accounts in some measure for the prevalence of these pale abnormal forms, is in the highest degree probable.

Some few species common to the United States are also perfect cosmopolites. The "painted lady" butterfly (*Pyrameis Cardui*, L.) is found in every part of the world. The Antiopa (*Vanessa Antiopa*, L.) is common to all parts of North America except the extreme north or polar regions, and is also found all over Europe, and in Siberia and Japan. *Leucania Unipuncta*, the "army worm," is also found in many parts of the world. The Plexippus butterfly (*Danais Plexippus*, L.) has been within a few years introduced, by easy stages doubtless, from our own country to Australia, where it is as common now as with us; the chrysalis, or even the perfect fly, for it is hardy, doubtless was through commerce carried from San Francisco to some point not far distant in the Pacific, and from thence further, and so on until Australia was reached.

Of species introduced from abroad, and now thoroughly acclimated here, we have the White Cabbage fly, so often and unfavorably spoken of, the

Currant borer, (*Sesia Tipuliformis*,) and the Cynthia moth. As yet, no example of any fossil butterfly has been found in the New World, though many of other orders (*Hymenoptera*, *Diptera*, etc.) abound in the shale of Colorado. All the Fossil Lepidoptera known, about a dozen examples, are from Europe; five from Aix, in Provence, in France; four from Radoboj, in Croatia, one from Germany, and three from England. (On these last, some doubt has been thrown as to their being butterflies at all.) As far as I can determine from figures and descriptions, one of them (*Vanessa Atava*, Charp.,) is of the same genus as several that occur in the United States, (such as *Vanessa Californica*, Bdl., *V. Vau-album*, W. V., etc.) And three others, (*Pierites Freyeri*, Heer, *Thanatites Vetula*, Heyden, and *Pamphilites Abdita*, Scud.,) belong to supposed extinct genera, allied to the existing Pieris, Nisoniades, and Pamphila, all largely, and the last two principally found in the United States; two of the others, (*Cyllo Sepulta*, Bdl., and *Lethites Reynesii*, Scud.,) are apparently allied to our Portlandia butterfly, (*Debis Portlandia*, Fabr.,) all the other representatives of whose genus are Asiatic. Of the remaining species, all belong to genera which have no living representative. The one described by Heer as *Thaites Ruminiana*, I consider the most interesting. It appears to be, as Scudder suggests, (in Proc. American Association I, pages 57–62, Plate III, Figures 1, 3, 6, 7, 8, 9, 10,) allied somewhat to the modern genera *Thais* and *Parnassius*, but I fear the figure of the restoration (Figs. 3, 2, c.) was founded as much on a knowledge of species of those genera, as on the fossil itself. Without there being any similarity worth noticing in detail, this same restoration reminds me forcibly of *Doritis Appolinus*, Hbst., a butterfly belonging to, and comprising a genus allied to Thais and Parnassius mentioned.

From what I have stated here, as well as elsewhere in this paper, it will be seen how necessary it is for the student, in endeavouring to attain some fair knowledge of the study, to devote attention to the species from other countries as well as from our own, for all are but links in one continuous chain, and many apparently inexplicable points become clearly explained by a knowledge of the genera and species comprising the faunæ of other lands; for nature has set no township or county lines in these matters. All are but integral parts of one great system. I do not by this advise any one to undertake the frightful task of making a collection of butterflies from all parts of this earth; but time devoted to the study of such authors as Westwood, Hewitson, Felder, Boisduval, and others, will not be misapplied; but, of course, a fair acquaintance with our own species should first engage the attention. One of the earliest books treating solely on butterflies and moths of North America, was that of Abbot and Smith, on the Lepidoptera of Georgia, published in 1797, in two large volumes, with one hundred and four colored plates, representing the insects in all their stages. Boisduval and Le Conte published the next principal work, the Histoire generale et iconographie, etc., in 1833, with seventy-eight colored plates; this is in French. Thomas Say, of Philadelphia, published three volumes of his American Entomology in 1824–1828, with fifty-four colored plates of insects of various orders.

Dr. Harris, in 1841, published his report on the insects injurious to vegetation. Subsequently revised, enlarged editions were issued in 1842, 1852, and 1862. This work is standard, and too much cannot be said in its favor. The last edition (of 1862) is profusely illustrated with plain and colored plates of North American insects of all orders. Besides this, Dr. Harris wrote large numbers of articles on economic entomology for the various agricultural and scientific periodicals and journals of the day.

In 1862 the Smithsonian Institution published a synopsis of all the then known butterflies and moths, as far as the end of the Bombycidæ, or Spinners, which was compiled by the Rev. John G. Morris, D. D., of Baltimore. Though many scores of species have since been discovered and described, this book can still be consulted with advantage to the student, as it contains short descriptions of all the species cited.

Prominent among those of the present time who have devoted themselves largely to the subject, especially in its relation to agriculture, is Prof. Townend Glover, late Entomologist of the Agricultural Department, from which position he has at length been forced to retire, utterly broken down in health, the disastrous result of years of untiring, incessant, self-abnegating labor in this branch of science. Some slight idea of this man's wonderful industry and perseverence may be formed from the fact that in default of the patronage that should have been given him by the Government he so long and faithfully served, he published small editions of five of his works for private distribution, in which not only were all the copperplates that illustrate them the work of his own hands, but the voluminous accompanying text was also lithographed by himself, after his official hours, in the time that others devote to rest and recreation. These works are, however, but a tithe of his labors, as besides the many agricultural reports, an immense amount of his manuscript is yet unpublished, which, unless the Government takes some measures, I much fear will be lost to science. The extent of Prof. Glover's labors are yet to be estimated at their true value.

Prof. C. V. Riley, his successor in office, has contributed largely to the knowledge of economic and scientific entomology. The "American Entomologist and Botanist," which was first published in conjunction with the late Benjamin D. Walsh, and latterly by himself solely, cannot be spoken of in terms sufficiently commendatory. It should, in fact, be in everybody's hand. His various reports on the noxious and beneficial insects of Missouri, issued whilst he was official entomologist to that State, are invaluable. His discoveries in regard to the grape pest, the Phylloxera, secured him the honor of a gold medal, especially struck for the purpose, from the government of France.

Dr. Asa Fitch, when State entomologist of New York, issued reports on the noxious, beneficial, and other insects of that State, during the years from 1855 to 1870, excepting only 1868. These contain a large amount of interesting matter, the result of careful, laborious study, but they are long out of print, and, unfortunately, exceedingly difficult to obtain.

Prof. J. A. Lintner, of Albany, New York, has done much truthful, conscientious work in his entomological contributions in the annual reports of the New York State Museum of Natural History.

Dr. A. S. Packard's noble work on the geometrid moths of North America was issued under the auspices of the Government. The same author also issued, some years ago, a "Guide to the Study of Insects, but unfortunately it is entirely too scientific to be of any use whatever to anyone but the advanced student, who don't need it at all.

A. S. Fuller, of Ridgewood, New Jersey, formerly connected with *Moore's Rural New Yorker*, and Prof. S. S. Rathvon, of the *Lancaster Farmer*, are so well known to you all, and have both contributed so largely to entomological and agricultural literature, both popular and scientific, that more than the mention of their names would be superfluous.

W. W. Saunders, the editor of the *Canadian Entomologist*, has contributed to a great extent to the knowledge of the transformation, habits, etc., of North American insects. Most of his articles are contained in the aforesaid periodical, of which he has long been editor in chief.

In the bibliography of my lately issued text-book on North American butterflies and moths, I have endeavored to give a full list of the writings of all these authors mentioned, as well as of all others who have written on North American butterflies.

Now, doubtless, you not only think it is time to make the beginning of the end, but even to make the end. That more attention is not given in this country to directing the youth to the study of nature in its various branches cannot be sufficiently deplored. In Europe every school boy has his herbal, or his collection of birds eggs, or of insects, or minerals, as the case may be, here most school boys waste their golden hours in bat and ball, in idleness and thoughtlessness, utterly ignorant that the only true mode of recreation lies in the change of occupation. Certainly it is far more instructive, surely as healthful, and produces far better results, to go into the fields and woods, where every leaf, worm, fly, aye even the stones we tread on, furnish matter for wonderment and admiration. Neither in pursuing such a course will ensue any of the evil effects most always the result of the so called healthful games, such as the loss of an eye, of front teeth, a broken arm, and permanently distorted or crippled fingers. It is true, there has been little encouragement for these field and forest studies, for it has only been within a very few years that the collecting of insects or "bugs" has not been considered in this country as *prima facia* evidence of a disordered intellect, and the few votaries of entomology were obliged to keep their collecting implements out of sight until the freedom of the woods was obtained.

I recollect some ten or twelve years ago, one Sunday, whilst collecting in a neglected field, near Bernhard's dam, that the proprietor of the ground, or of some neighboring territory, a pleasant, hale old gentleman, came down in his shirt sleeves to gratify his curiosity in regard to my doings. He first approached with the proper caution due to nearing an equivocal animal, but assuring himself by the placidity of my countenance, doubtless, that there was no apparent danger to be dreaded, he approached me, and in the Pennsylvania German dialect asked what I was doing. I showed him my collecting box and its contents, my net, etc., and as at the moment a large female of the Ephestion butterfly flew near, I joined example to precept by capturing and killing and pinning it in my collecting box in his presence. The most difficult part to make the old gentleman comprehend, was what the things could be used for after they were caught. I attempted an explanation. Whether I was successful in doing so to his satisfaction I still doubt. However, he seemed pleased, and by way of explanation said, as he departed: "Ich haab dich gasayn for ein bar Suntaag here und durt so rum springe un ich hab gaydenkt du waarst so ein Kaerl wo nicht gons recht in kopf war, aber."* Here he paused and looked puzzled, and I fear to this day the worthy old husbandman, (bless his kindly face,) is still, if living, in a state of suspense as regards my being responsible for my actions before the Lord and my fellow-man.

Later, however, since it has become more generally known that these things will actually sell for money, the discerning eye of the public looks with considerably more leniency on the "bug hunter." In one instance a couple of years since, even such a distinguished functionary as a Florida judge graciously vouchsafed to turn the energies of his great brain matter in that direction, though in the case of so exalted a personage, it, of course, was by proxy he deciding like the bald eagle that feeds at the expense of the fish-hawk which catches the prey, to remunerate himself by the labors of others, by seizing the persons of two collectors from Michigan, Messrs. Hubbard and Schwarz, and incarcerating them in the county jail as breakers of some local law that no game should be taken out of the State.

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* "I have seen you running around here and there for the last couple of Sundays, and I thought you was one of those fellows who were not quite right in the upper story, but"——

This embodiment of legal acumen hinted, that as he was a feeling man, the matter might be satisfactorily adjusted for the moderate sum of fifty dollars, which these two gentlemen did not pay, but after one night spent in "durance vile," managed to obtain their freedom through the influence of some one in power, with a less fully developed bump of acquisitiveness than the worthy judge, who after all only followed out the instincts of his nature, as do most other animals. May the earth rest lightly on him hereafter.

Good friends, if I have been able to direct your attention to one fact of interest in our beautiful study, I am happy. I make my salam, and withdraw, content.

THE TWO CATALPAS.---A MEMOIR OF THE SHAVANON.

WRITTEN FOR THE PENNSYLVANIA FRUIT GROWERS' SOCIETY.

To the Chairman of the Committee on Arboriculture:

Having some years since been complimented, by the vote of your excellent society, with the privileges of honorary membership, and holding also, perhaps, a birth-right membership in every good undertaking in the dear old mother State of Pennsylvania, your fellow comes before you, in this way, as some compensation to him for the inability to enjoy a personal intercourse with his good friends of the Pennsylvania Fruit Growers' Society.

Like ourselves, in the State of Ohio, so you, in the parent State, have advanced, in practice; if not in name, from a pomological society to one which considers other and more general topics related to horticulture. Thus the functions of your committee are to look after the trees, arboriculture, or sylviculture, and it is to be supposed that your attention will not be confined exclusively to those trees which yield orchard fruits, but may embrace, also, those which are simply ornamental, with foliage and flowers, or those which have their claims upon our respect, founded upon their great value as the source of our timber supplies.

It is with trees that present themselves as candidates for our favor, in both these latter categories, that your attention is now solicited. You are asked to consider a tree that has long been familiar to you on account of its showy inflorescence, and of another, very nearly allied to it, which has still more showy flowers, and a superior habit, making a more beautiful object in the lawn or on the avenue, and also constituting a more noble tree in the forest, and providing a most valuable material as lumber, which, like that of its congener, with which you are familir, is of a most durable character. Besides being light, sufficiently strong, and also of great beauty for joinery, cabinetware, furniture, and the inside finish of your houses, it is equally enduring, perhaps, more so than any other timber.

You may already have guessed that the tree to be introduced will be the

Catalpa, which will be alluded to more particularly in its western form, described and named in 1853 as the variety *speciosa*, on account of its very showy inflorescence. This may not be so familiar to my eastern friends, who will now be so good as to allow it the honor if a formal presentation and of a brief audience.

We have two catalpas, both native, an eastern and a western form. Our western tree has a wide habitat, stretching, according to Michaux and Nuttall, (neither of whom, however, seem ever to have differentiated it as our western tree planters have learned to do,) from Vincennes, Indiana, to southern Illinois; the western lowlands of Kentucky and Tennessee, to the swampy lands of southeastern Missouri, and the adjoining regions of Arkansas, and on most of the lower tributaries of the Mississippi. This tree was accidentally or purposely introduced into Ohio, and into at least two different and widely separated localities. At first it was only known as the Catalpa, and meanwhile the eastern or normal, the specific form, the *Catalpa bignonioides* of Walter, had been widely distributed by the nurserymen, and others all along either side of the fortieth parallel, until it had transcended the father of waters. Here both trees were planted together, and here it was that the superior hardiness of our western tree was first observed and made public by Suel. Foster, of Muscatine, Iowa, on whose grounds the crucial test of such a winter as that of 1855 and 1856 was made, with the escape of the speciosa and the destruction of the *bignonioides*. The speciosa has stood for years on the high exposed bluffs of the Missouri, at Omaha, Nebraska, and has been planted at various places on the open plains of that State where the eastern species is apt to be killed more or less every winter.

In a few words, the differentiation or diagnosis of the variety may be presented to you. Possibly this newly appreciated tree may already have found its way among you, though trees like men, are apt to follow the star of the empire in another and opposite direction. Newly appreciated is the word, but it was most highly appreciated in the early part of the century by the French settlers on the Wabash, and long before them by the Indians, who utilized it as the favorite material for the construction of their canoes, some of which were clear three feet wide between the gunwales, and proportionally long, perhaps thirty to forty feet. The observant Gen. Harrison, afterwards President, when acting as Governor of the Northwest territory, fully appreciated the Shavanon tree of the Indians, and used it. Some posts of his planting were in good condition when removed, after having done service in a fence during forty years. Some of them were reset in another fence, now standing, and others which have been chopped off for kindling, are said to have their stumps still sound in the soil of the river bottoms subject to overflow; though since they were planted, large trees have sprung up beside them, having a diameter of three feet.

Near the old gubernatorial mansion, at Vincennes, are Catalpa trees probably of Harrison's own planting, one of which, recently measured, is three feet in diameter, with a tall, erect stem bearing its top branches fifty feet above the ground, and having branch-width of equal breadth. This is called the Treaty Tree, under which he may have cemented the compact with the warlike Te-cum-the, which has been followed by the peace and prosperity of a wide extent of country, now the great States of Indiana and Illinois. The verification of this is left to the historians.

Though a great admirer of this tree, the Governor knew it only as the catalpa, without botanically observing it, and so it was reported to Mr. Nuttall, who, in his *Genera*, p. 10, on the Governor's authority, gives this region as "an indubitable habitat;" for up to 1836 that distinguished botanist and extensive traveler had never seen the Catalpa in a state of nature, as he tells us he then did "on the banks of the Chatta-hoot-shee, near Columbus, Georgia."—*Sylva Americana, Vol. III, p. 77.*

On leaving his office, Governor Harrison brought the Western Catalpa with him to his farm at North Bend, on the part of which this memoir is now being written. The tree has been spread about the neighborhood, and has become already naturalized, though on a very different soil from that of its native habitat. Some of the trees have been cut, dressed, and planted as gate posts. Though taken at midsummer, (July 2, 1852,) they are to-day firm and sound.

But to the differentiation. Supposing you familiar with the *Catalpa bignonioides*, it may be said of the speciosa that the tree is taller, straighter, less branched, more symmetrical, more hardy, than the Eastern species. The bark, snug, compact, moderately furrowed, and not disposed to flake off, as it does in the other species. The flowers are more abundant, larger, of a purer white. The fruit is usually longer, sometimes, but not often, exceeding two feet; larger, and generally it is distinctly grooved the entire length; cylindrical, and not elliptical on a cross-section, as in the Eastern tree. The seeds present the surest and safest distinguishing mark of all these, as the coma is spread and less pointed, the tissue soft and silky, and the grains are larger.

My dear sir, and gentlemen, hoping that all this may not be considered the vaporing of an enthusiast, but, as it is the earnest effort to advance the noble study of our arboreal treasures, and the contribution of one deeply interested in sylvæculture, he remains yours in the sentiment *e sylvis ad sylvas nuncio.*

JOHN A. WARDER, M. D.,
President American Forestry Association, North Bend, Ohio.
December, 1878.

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Leg. Doc. No. 4.

ANNUAL REPORT

OF THE

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JAMES CALDER, D. D.

Faculty.

President,

JAMES CALDER, D. D.,

Professor of Mental, Moral, and Political Science.

Vice President,

JAMES Y. McKEE, A. M.,

Professor of English Literature and the Greek Language.

WILLIAM A. BUCKHOUT, S. M.,

Professor of Geology, Zoology, and Botany.

JOHN HAMILTON, M. A. S.,

Professor of Agriculture.

JOHN F. DOWNEY, S. M., C. E.,

Professor of Mathematics and Astronomy.

WALTER HOWE,

First Lieutenant, 4th Artillery, U. S. A.,

Professor of Military Science and Tactics.

C. ALFRED SMITH, M. A. S.,
Professor of Chemistry.

ANNA M. COOPER,
Lady Principal.

CHARLES F. REEVES, B. S.,
Professor of Modern Languages.

JOHN W. HESTON, A. B.,
Principal of Preparatory Department.

I. THORNTON OSMOND, A. M.,
Professor of Physics.

Rev. WILLIAM W. CAMPBELL, A. M.,
Professor of Latin and History.

. . . .
Professor of Horticulture.

EDWARD H. CHRISTIE, A. B.,
Assistant in Preparatory Department.

FRENCH VICTOR GARWOOD,
Instructor in Music.

Superintendents.

WILLIAM CALVIN PATTERSON,
Superintendent of College Farm.
P. O.—State College, Centre county.

WILLIAM C. HUEY,
Superintendent of Central Experimental Farm.
P. O.—State College, Centre county.

WARREN R. SHELMIRE,
Superintendent of Eastern Experimental Farm.
P. O.—West Grove, Chester county.

SAMUEL LOWMAN,
Superintendent of Western Experimental Farm.
P. O.—Indiana, Indiana county.

STUDENTS.

The students in attendance this year are as follows:

Post graduate,	1
Graduates at last commencement,	7
Seniors,	8
Juniors,	8
Sophomores,	17
Freshmen,	30
Special,	7
Preparatory,	77
Total,	155

Of the above number forty are females.

NEW PROFESSORSHIP.

At the meeting of the Trustees, held on the 25th of June, the chair of chemistry and physics was divided, Prof. Smith retaining the department of chemistry and Prof. I. T. Osmond being subsequently elected professor of physics. At the same meeting a new professorship, for the giving of instruction in horticulture, was established, and the Board is now in correspondence with a gentleman who will probably be called to that position. The changes and improvements of laboratories, apparatus, &c., rendered necessary by these additions, have been promptly and liberally undertaken by the Executive Committee. Some of them are set forth in the portions of this report which more fully speak of the departments of chemistry and physics.

DEPARTMENT OF CHEMISTRY.

Until the opening of the present collegiate year the duties of the professor of chemistry embraced instruction in both chemistry and physics, and the varied nature of his duties, as well as the broad field for research presented by each of these sciences, precluded the possibility of either as thorough instruction or as ample experimental development as is called for in an institution which should be largely devoted to the development of agriculture and industrial art. By the division of the chair of chemistry and physics, the professor of chemistry now gives his entire attention to general, agricultural, and analytical chemistry. The necessity is recognized of still further subdividing the labors of this chair, so as to provide for a professor of general and analytical chemistry and mineralogy, and a professor of agricultural and industrial chemistry.

These instructors, with their necessary assistants, will enable the institution to not only offer the most efficient class-room instruction in the various branches of this important science, but to prosecute such special investigations in the field and in the laboratories as shall greatly enhance the value of the results from year to year obtained on our experimental farms, and also make this college an authority upon certain special lines of industrial work.

The course of instruction at present is as follows: Students take up the text-book study of chemistry in the fall term, Sophomore year, completing inorganic chemistry by the middle of the winter term. Organic chemistry is then taken up, using text-book. In the spring term students in the agricultural course have lectures on agricultural chemistry. Students in the scientific course have lectures on chemical philosophy, and an introductory course of lectures on industrial chemistry. During this term students spend eight hours per week in introductory chemical practice in the laboratory. In the course of this practice the student becomes familiar with all the more important elements and their compounds, together with the manner of their action and reaction upon each other; develops habits of thought in witnessing and tracing out the phenomena before him, and is thus prepared intelligently to enter upon his subsequent practice in qualitative analysis.

Practice in qualitative analysis begins with the winter term, Junior year, and continues to the winter term, senior year, when quantitative practice is taken up, and occupies the student to the close of his collegiate course.

During the Junior and Senior years, one hour per week is devoted to lectures upon methods of analysis—chemical processes—and upon chemistry as applied to the industries of life.

With a view to better work in this department, certain changes in the chemical rooms and laboratories were authorized by the Board of Trustees in June last, and at this writing these improvemants have been largely completed.

The chemical lecture-room occupies the southeast corner of the first floor, is fitted with raised seats, with attached shelf desks for taking notes, has a seating capacity of ninety, and is admirably adapted for the purpose of experimental illustration of lectures.

Adjoining this room, on the west, is a room designed for the preparation of material for experiments, &c., and for the present a portion of the room is in use for the collection of what is designed to be, so far as possible, a complete museum of the industrial arts. Here is being gathered material with which to illustrate lectures on industrial chemistry, exhibiting each article in all the different states through which it passes between the points of its original production, and ultimate consumption. Such a museum, though requiring years of time for its collection, must be of incalculable benefit to the student, in acquainting him from actual observation, not only with the finished manufactures, but also the crude materials and refuse products, concerned in the more important industries of the world. Westward still of this room is the professor's laboratory, and rooms for special investigation. This is a large room, formerly in use as a general laboratory. By means of glass partitions, the space has been divided into five rooms, the center being used as the professor's laboratory, with two small rooms on the west, one being used for mineralogical cabinet and balance-room, the other fitted with hood, steam evaporator, and appliances for special chemical work.

On the east of this center room is the students' balance-room. In this room is placed also the students' consulting library of chemical journals and works of reference in daily use in their laboratory practice.

In the basement, immediately under the professor's rooms, and communicating by private stairway from an ante-room, is the furnace-room. Here are furnaces for assay work, &c. Muffle furnaces for the incineration of agricultural products for ash analysis, copper still for use in preparing distilled water for chemical uses, and a new distilling apparatus just erected, to enable pure water to be prepared from condensed steam from the boilers used for heating the college building. In this room, also, is a large steam drying oven, used for determinations of moisture in agricultural products.

Adjoining this room on the west, is the qualitative laboratory, and laboratory for beginners. This room has been entirely re-fitted the past summer, making it one of the most complete rooms of its kind in the country. Here are work tables for twenty-five students, each furnished with attachments for use of the Bunsen filtration pumps. The room being also provided with hoods for evolving gases, hot and cold water, steam drying closet, and steam evaporators. Opening from the furnace-room on the east, is the new laboratory for advanced students in quantitative analysis. Work tables are provided for twenty-four students, with room for additional tables when required. Each desk is fitted with attachments for the Bunsen filtration pumps, and the laboratory is supplied with the very latest and most approved appliances for the prosecution of successful quantitative analysis. In this room, students of the Senior class make analyses of minerals, ores, slags, and the various agricultural and chemical products, while post graduates, and advanced special students pursue investigations in the line of their particular specialty.

DEPARTMENT OF PHYSICS.

Until the present year, the department of physics has been combined with that of chemistry under the charge of a single professor, sometimes with an assistant. The principal attention had been given to chemistry; and as it was impossible for one man to build up both departments, or manage both, so extensive and important is each, physics had to some extent fallen behind the progress in other departments of the college.

CHAIR OF PHYSICS.—The trustees, at their annual meeting in June, 1879, established the professorship of physics as an independent chair in the faculty of the college, and the executive committee soon after elected a professor to the position, who entered upon his duties at the commencement of the college year in August.

To accommodate the new order of things, some changes were necessary in the several courses of study. Mechanics has been taken from the Senior year and placed in the fall term of the Junior year, as being the proper introduction to an intelligent study of physics. Beginning thus with the principles of analytical mechanics in the fall term of the Junior year, the course in physics extends through five terms of each of the several courses of study.

Besides the study of the text-books and the lectures of the course, there are one hundred and eighty hours of laboratory work, in which the student learns to use instruments himself, to conduct experiments, to observe and record his observations, and finally to reduce observations.

TEXT-BOOKS AND WORKS OF REFERENCE.—Ganot's Physics, (*ninth* revised edition,) Peck's or Todhunter's Mechanics, Ball's Experimental Mechanics, Deschanel's Natural Philosophy, Jenkin's Electricity and Magnetism, Marwell's Theory of Heat, Pickering's Physical Manipulation. The library contains other valuable works on physics, and scientific periodicals accessible to students.

APPARATUS.—To much valuable apparatus already in the department of physics, there has just been added

1. A complete set of apparatus and instruments for use in *experimental mechanics*, illustrating the composition of forces, resolution of forces, laws of motion, laws of gravitation, laws of pendulum, mechanical powers, friction, inertia, centrifugal force, laws of falling bodies, mechanical properties of matter, and mechanical principles of structures. This apparatus is not composed of the toy-like instruments of the catalogues of school apparatus, but

has been made especially for the college. It employs forces of from a few pounds to hundreds of pounds, giving very large stresses.

2. A Coulomb's Electrical Torsion Balance.
3. An Astatic Galvanometer, and a Differential Galvanometer.
4. An Ohm, or B. A. Unit.
5. A Thermopile of forty-nine pairs of Bismuth and Antimony.
6. A Magneto-Electric machine with Siemen's Armature.
7. A number of other articles and instruments.

LABORATORY AND ROOMS.—The rooms belonging to the department of physic, are in the second story of the college, front, having sunlight from sunrise till late in the afternoon. They are a lecture-room, physical workshop, and physical laboratory. The last two have just been added. The workshop is between the other two, and communicates with each. It contains a good set of tools, a work-bench and vise, a lathe, with tools for wood and metals, a scroll-saw, and a hot-air engine. It is of great value, indispensable, in repairing and making apparatus and articles requisite to a physical laboratory.

The laboratory has been formed by throwing two rooms into one large room. It has been fitted with substantial tables suitable for physical work, and both it and the lecture-room are supplied with water. Additional rooms are to be fitted as soon as possible, for laboratories of special subjects, as photometry, projections, &c., thus increasing the facilities for various experiments. The trustees also intend to appropriate further sums for the purchase of valuable apparatus as rapidly as possible.

While it is no part of the proper work of this department to instruct or train in the use of tools, or the constructing of machines, or other products of mechanical art, yet the study of the principles of analytical mechanics, and their practical demonstration in that part of the laboratory work given to experimental mechanics, will give a trained and intelligent mind to observe and direct the hand in whatever it may essay. Thus a part of the work in physics, beside its educational and scientific value will be of invaluable practical benefit to those purposing to enter the mechanic arts or engineering.

SCOPE OF THE DEPARTMENT.—The work of the department of physics as now planned, and already entered upon, is designed to give the student (1) a thorough knowledge of the subject; (2) experience in the use of apparatus; and (3) the ability to experiment with care, to observe with precision, and to determine what the results of his observations teach.

The principles of the science are taught from the text-books and by lectures, and are illustrated by experiments, for which there is a valuable collection of apparatus pertaining to dynamics, properties of matter, light, heat, sound, and electricity. The laboratory work, requiring the student himself to perform experiments, makes real to his conceptions the truths he is learning.

DEPARTMENT OF MODERN LANGUAGES.

The Department of Modern Languages has the German and French languages as regular and elective studies. It aims to give the student a good practical, as well as theoretical knowledge of them, such as will enable him to make practical use of them, should he have the desire to do so.

Otto's Coversation Grammers are used by beginners in laying the foundation; and oral and written translations and black-board exercises are used, so that the tongue and ear are cultivated as well as the eye. Then follows a general course in literature, which introduces the student to the classical and standard writers in the language here taught.

Students in the agricultural course may derive much benefit from the study of German, as this language is replete with valuable works on this subject.

The foreign element is becoming a very important part of our population. These facts, in addition to that of our rapidly increasing foreign commercial relations, make it evident that a knowledge of these languages, especially, is an advantage, and, in many instances, a necessity.

THE LIBRARY.

The Library belonging to the College contains about two thousand volumes, embracing scientific and technical works, memoirs, scientific essays, agricultural and educational works, &c., in English, French, and German, forming the nucleus of a fine scientific library. Certain scientific periodicals, purchased by the College for the use of the different departments of instruction, are also added to the library, from time to time, as they accumulate. A number of valuable books and periodicals have been added during the past year by gift and purchase.

THE PREPARATORY DEPARTMENT.

This department is an important feature of the institution. It is located in the eastern part of the building.

The college being large and commodious is divided, by partitions, into three parts, the eastern section of which is devoted mainly to the preparatory department. It has ample recitation-rooms and comfortable dormitories which the students of the department occupy. The *purpose* aimed at in this department is twofold: First, to prepare students for any of the three collegiate courses by giving them thorough instruction in the elementary work required for admission to the collegiate courses. Second, to adapt, as far as possible, the studies of the department to the needs of its pupils who may not remain and pursue regular studies in the collegiate department. The *studies* of this department require two years for their completion. During the first year the student pursues the common school branches and the introductory work of algebra. If the student is preparing for a classical course, Latin is required during the entire year. The studies of the second year comprise a wider range of topics, since more advanced algebra is pursued in addition to higher analysis of English grammar, United States history, book-keeping, and practice in English composition; with such other studies as can be profitably taken up by the student.

Further instruction is also given in Latin; and Greek is required for all students preparing to enter the classical course.

The recitations are from forty to sixty minutes in length, thus giving sufficient time for thorough drill in the foundation work of a course. The recitations take place during the morning hours, through both years of the course.

Practical instruction is given to all students. The first year's practicum consists of penmanship, map and freehand drawing, also vocal music. One hour each day is devoted to this important feature of the department. During the second year the practicum is instruction and practice on the farm, garden, and campus.

The relation of this department to the collegiate is worth a word of explanation.

The preparatory students, although in the same building with the collegiate students, are governed by different rules. They are required to observe study hours, during which time they must remain in their own rooms. They are not permitted to visit, nor in any manner waste time which should be occupied in preparing their lessons.

They, however, have the advantages of associating with collegiate students during hours of recreation, in literary societies, and at such other times as will not interfere with the required duties of their class work.

The number in attendance the present year is seventy-seven. It is hoped that before long farmers, and indeed all citizens of the Commonwealth, will awake to the great advantages the preparatory department of this college offers to them, and that they will improve the facilities here given for obtaining for their children that education which will make them intelligent and valuable members of society.

The instruction is entirely free, and thus is within the reach of all; and no young man or woman can faithfully pursue a full course of studies and practicums given in this department without being a competent leader in any society and useful laborer in the various occupations of life.

PROFESSOR'S DWELLING.

On the gently sloping ground, east of the college building, and a short distance northeast from the entrance gate to the college campus, is the site selected in August last for the erection of a dwelling for the use of the professor of chemistry. Ground was broken for the foundation August 13, and it is expected the house will be ready for occupancy early in June, 1880. The material is blue limestone, size 42×50 feet, two full stories, with attic—cottage roof—and will cost about $5,500. The building is designed to present two fronts, the main entrance being on the west, facing the college campus. The approach from the turnpike is by a twelve-feet drive, leaving the main avenue near the entrance gate; crossing a natural drain by a rustic bridge; curving round the south side of what was an old quarry (now being transformed into a dell of ferns and vines) to the main entrance of the dwelling.

The grounds adjacent to the house extending to the eastern boundary of the farm, and south to the turnpike, formerly under general farm culture, are now included in the campus, and with their proposed embellishment will add greatly to the attractiveness of the college surroundings.

INTEREST BY FARMERS.

The officers of the College regret that they are not better sustained in their work by those for whose special benefit the institution was founded. Comparatively few farmers avail themselves of the superior advantages here so cheaply offered them for the education of their children. The thorough course in agriculture is taken by fewer students than either the scientific or classical course. Even the offer of the privilege to take a few studies, or a brief special course, is accepted by very few students who come from farms, or who purpose devoting themselves to agricultural pursuits.

If the objects aimed at, or the methods pursued by the present board of trustees and faculty, fail to meet the wants of the industrial classes, those classes have in their own hands the power with which to bring about desired changes. The courses of study are arranged by the faculty, under the advice and subject to the approval of the trustees. The faculty itself is chosen and directed by the trustees. The trustees are not a self-perpetuating body; but those who are not members of the board because of their holding some other office, are all elected by delegates chosen for that purpose by the State Agricultural Society, and by county agricultural societies and mechanical associations.

Thus the farmers and mechanics of the State, who are sufficiently interested in their respective callings to identify themselves with societies organized to foster those callings, have it in their power to change the board of trustees whenever they deem it needful to do so. And yet it is almost impossible to get a sufficient number of such delegates to attend any annual election of trustees. The members of those societies neither send their children to be educated in the courses already established, nor do they send delegates to put in trustees who will establish better courses.

Much complaint is, at times, made by farmers and mechanics that professional men are taking to themselves all the positions of power and honor in our land, and that they claim the privilege of representing the industrial classes even in matters whose interest is peculiar to those classes. If this is a fact, is it not largely because those classes refuse the opportunities by which they could be qualified to perform the esteemed work, and be enabled to best represent themselves on all occasions, and as to all their interests?

By the approval of the board of trustees, the president of the college has devoted a large part of the present year to the work of acquainting farmers with the aim and facilities of the institution, and inducing them to give it their sympathy, counsel, and patronage. He has visited various parts of the State, and has addressed between forty and fifty meetings of farmers. It is hoped that this work will not prove altogether fruitless, and that in the near future a much larger representation from the farmers of the Commonwealth will be found enjoying the benefits of the college.